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331 Users Report Disk Drive Problems

By Tom Henkel
CW Staff

IBM 4331 users planning to attach the IBM 3340 disk drive to their systems may wind up getting less than they bargained for.

Some users have reported that the 3340 drives run slower than they expected and that the software necessary to make the 3340 work with the 4331 mainframe takes up too much main memory.

IBM 3340 users have also found some minor software problems in the 4331's DOS/VSE operating system that won't allow 3340 drives to perform certain functions. Independent vendors' 3340-compatible disk drives don't seem to have the same software problems, users said last week.

When IBM announced the 4331, it also announced two disks: the 3310 with a capacity of 1.032M bytes and the 3370, with a capacity of 9,136M bytes.

The firm also claimed that the 3340 would work with the system, and several users who cannot use the smaller 3310 have been trying to use the 3340 while they wait for deliveries of the 3370.

In addition, users like the removable disks on the 3340, a feature not available with the 3310.

However, the question of compatibility between the 4331 and 3340 is not that simple, users report.

To get the 3340 to work on the 4331, users must install an IBM-supplied software emulator so the 3340's stored data looks to the system like data from a 3310. This emulator eats up a huge amount of main memory — one user reports that 200K bytes of main memory was taken up by the system, half his total. In addition, the emulator slows down the operation of the 3340 — even though that unit was already slower than the 3310.

Users who transferred 3340 drives from 370s to 4331s noticed a 10% to 20% degradation in performance. One user, however, said the degradation was closer to 30%.

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FAA Blasts Critics as 'Shameful'

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — An "interunion squabble" is behind recent charges that the Federal Aviation Administration (FAA) attempted to cover up the severity of computer outages at U.S. Air Route Traffic Control Centers, according to Federal Aviation Administrator Langhorne Bond.

In an appearance before the House Aviation Subcommittee here last week, Bond labeled recent criticisms a "substantial misrepresentation" of the facts and said they were "inaccurate" and "shameful."

Several organizations representing air traffic controllers and FAA systems specialists have exploited the situation to enhance their image among potential members, he charged.

"The system is vigorous and productive, healthy and safe, and I have no apologies for its record over the last 10 years," he explained at the hearings, which were called after several near-miss air collisions. One such incident occurred Oct. 31 over North Carolina [CW, Nov. 12] and two more occurred over San Diego, where a mid-air collision claimed 144 lives on Sept. 5, 1978.

Several organizations, including the competing Federal Aviation Science and Technological Association (Fasta) and the Professional Airways Systems Specialists (Pass), have claimed the FAA is falsifying the number of computer outages at the Air Route Traffic Control Centers. They maintain the outages are a major cause of these and other near-accidents.

Bond strongly refuted their arguments, defending the complex com-

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Rewrites of '34 Act Emerging in Congress

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Revised legislation designed to replace the Communications Act of 1934 emerged in the Senate last week, and it looks like the same thing will soon happen in the House of Representatives.

While the text of the House bill was not available, one of its authors — Rep. Al Swift (D-Wash.) — told *Computerworld* the bill would require AT&T to offer on-line information services and related equipment through fully separate subsidiaries. The earlier version of the bill (H.R. 333) merely required these subsidiaries to offer the same prices and service terms to all their customers — those inside as well as outside the Bell System.

The new House bill also says the Federal Communications Commission (FCC) can "reregulate" a "competitive" intercity telecommunications service if a carrier — through below-cost pricing, acquisition of competitors or other means — monopolizes it. The reregulation process can be launched by the commission on its own or on the basis of a petition from a user or supplier.

Swift expects the latest House bill to be formally introduced before Congress recesses late this month. He believes the legislation can be reported out of the House Communications Subcommittee in February and passed by the full committee the following month. That would allow several months for a final House vote and meshing of the House bill with the one likely to be produced by the Senate.

At the moment, three bills are pending in the Senate Communications

(Continued on Page 6)

IBM Gives 8100 Six More CPU Options

By Marcia Blumenthal
CW Staff

ARMONK, N.Y. — Although the wraps are barely off the 8100 system, IBM buffed it up recently, adding six 8140 processors, upgrading three models of 8101 storage and input/output devices and extending the system's main memory capacity to 1M byte.

When introduced in October 1978, the 8100 was heralded by some industry analysts as IBM's blessing of the distributed data processing concept.

The new 8140 processors, dubbed the B models, start off with the capacities offered as maximums on the A models, an IBM spokeswoman noted. Their main memory ranges from 512K bytes to 1M byte, increasing in 256K-byte increments.

The older A models can also be expanded to 1M byte of main memory with this announcement.

Although price improvements for the new 8100s are not as obvious or drastic as other price-cutting measures IBM has taken recently, the 8140B offers double the main memory, 92% more disk capacity and 131K bytes of fixed head-disk storage at a price only 55% greater than that of earlier models.

In the past two months, IBM has cut

(Continued on Page 6)

He's a Businessman, But He Heads DP Operations Of 18 Companies

By Tom Henkel
CW Staff

GREENWICH, Conn. — Joe Carr has a title that sounds like a DPer's, and he uses the buzzwords commmn to the DP biz, but that's where the similarity ends.

Down deep, Joe Carr is a businessman. A transplanted marketing-exec-turned-consultant, Carr is now vice-president for information and logistic services at American Can Corp. The title is a beefed-up version of his old title — vice-president for information systems and services — but his job hasn't really changed that much. Carr is in charge of computer operations and business systems for American Can and 17 sister companies.

Freely admitting he "couldn't program [his] way out of a paper bag," Carr sees DPers differently from what some feel is the traditional top management attitude — namely, DPers are highly technical people who know computers and not much else.

Instead, Carr is a realist. He knows that in a changing DP environment with stiffer competition for sorely needed DPers, the old "DPers are great — if they know their place" thesis just won't fly.

Carr seems to be sitting on the other side of the fence. His stance seems to lean more toward "Even the DPer can make good — if he really wants to." He sees himself as a bridge-builder attempting to link the DPer with the business community.

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Top Canada Court Gets Fraud Case

By Brad Schultz
CW Staff

EDMONTON, Alta. — Canada's Supreme Court may eventually have to decide whether that nation's criminal code is equipped for prosecution of unauthorized computer users.

Crown prosecutors in Alberta are planning to present their case against 20-year-old Michael McLaughlin to the Supreme Court in Ottawa. Last month, McLaughlin's conviction for theft of telecommunications services, a felony specified in Canadian criminal code Section 287, was overturned.

McLaughlin and two other former students at the University of Alberta were charged under Section 287 last year because they reportedly used the university's Amdahl Corp. 470V/6 mainframe without permission. According to Canadian legal experts, Section 287 was written to deter illicit operation of telephones and does not mention computer or data communications equipment specifically [CW, June 26, 1978].

Nevertheless, the prosecutors cited that statute, which calls for a maximum penalty of 10 years imprisonment, because Canada has no federal law that comes closer to banning computer abuse.

One Acquittal

Near the end of 1978, a federal justice in Edmonton acquitted one of the ex-students, but found McLaughlin and a co-defendant guilty [CW, Jan. 8]. They were handed one-year suspended sentences [CW, Jan. 22]. McLaughlin alone appealed this decision, which the Alberta Court of Appeals overturned in November.

But the Alberta Crown prosecutors are determined to get clarification from Canada's highest judicial body on whether Section 287 really applies to breaches of computer security. The statute addresses anyone who "fraudulently, maliciously or without color of right abstracts, consumes or uses electricity or gas, or causes it to be wasted or diverted, or uses any telecommunications facility, or obtains any telecommunications services."

Canadian prosecutors can appeal rulings of acquittal under certain circumstances.

Should the Supreme Court find Section 287's language inapplicable, Canadian law enforcers face the prospect of having no law specifically covering surreptitious access of computer-stored files.

Dr. Jeffrey Buzen Receives CMG's Michelson Award

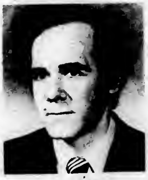
DALLAS — Dr. Jeffrey P. Buzen, founder and vice-president of Massachusetts-based BGS Systems, Inc., is the recipient of the 1979 A.A. Michelson Award for the advancement of computer systems measurement.

Given annually by the Computer Measurement Group (CMG) in recognition of outstanding contributions to computer metrics, the award was presented to Buzen by CMG's vice-president, William Miller of American Airlines, at the group's national meeting at the Fairmont Hotel here recently.

The citation accompanying the award — an inscribed golden ruler — cited Buzen for developing the "theory and practice of operational analysis which has provided [computer performance evaluation (CPE)] practitioners with an accurate yet mathematically simple approach to response time analysis."

It also noted his "original and significant contributions" to the application of classical queuing theory techniques to computer systems modeling and analysis. Lastly, the citation saluted Buzen for contributions to "the professional development of the CPE community through active participation and leadership in a wide range of CPU publications, conferences and professional organizations."

In addition to his work at BGS Systems, Buzen has held faculty positions at both Harvard and Brown Universities, has been an officer in a regional CMG and has led numerous CPE-related seminars on both sides of the Atlantic.


Dr. Jeffrey P. Buzen

Michelson Awards — named in honor of the 19th century physicist who devised a precise method of determining the length of a meter — have been given by CMG for nearly half a dozen years. Previous recipients included Kenneth Kolence and Dudley Warner, the "fathers" of software and hardware monitors, respectively, Dr. Thomas Bell and Philip J. Kiviat, former technical director of the Federal CPE and Simulation Center (Fedsim) and the man who conceived the graphic presentation of CPE data.

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A message from John R. Bennett,
President, Applied Data Research,
to firms considering DB/DC systems.

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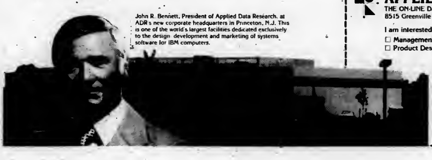
John R. Bennett, President of Applied Data Research, at ADR's new corporate headquarters in Princeton, N.J. This is one of the world's largest facilities dedicated exclusively to the design, development and marketing of systems software for IBM computers.

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Independent Drives End User's Dilemma

By Tom Henkel
CW Staff

JACKSONVILLE, Fla. — A user of a 4331 mainframe here is charging IBM not only sold him too small a system but also told him he would have to live with it for 180 days until more disk drives could be delivered.

When Atlantic Operations, a division of Atlantic Bank Corp., ordered three 4331s, it took IBM's advice that it needed only two 3310 disk drives on each of the systems. When the first 4331 was delivered about a month ago, DP Manager Pat Sullivan soon found two 3310 drives just wouldn't be enough.

When he asked IBM to give him larger 3340 disk drives, IBM said it couldn't deliver the drives for 180 days. This, Sullivan claimed, left him with a useless system.

"There was no way we could use the machine. We couldn't build files or [even] test it," Sullivan recalled.

IBM was willing to deliver more 3310s, but Sullivan said he couldn't use them becuase he would need a room full of 3310s to equal the capacity of two 3340s. Furthermore, the 3310s didn't fit into Atlantic Operations long-range plans because the disks cannot be removed.

The company needs disk storage with removable packs so the 4331s it plans for installation at its Orlando, Gainsville, Tampa and W. Hollywood regional offices can back up one another. If one goes down, operators can physically transport disk packs to the nearest operational site, Sullivan explained.

Memorex Alternative

The alternative, Sullivan decided, was to go to plug-compatible Memorex Corp. 3640 drives. Memorex offered to deliver its 3640 drives in two weeks. Sullivan also kept the two 3310s IBM originally delivered.

"The problem with IBM is, it markets so much equipment, and [the 3340] is the most popular guy on the block. You just can't walk in and pick it up off the shelf — they're all sold out," Sullivan said.

Although he thought he preferred the IBM 3340 drives, Sullivan said he's just as pleased with the 3540s.

Like other 4331 users, Sullivan realized 3640 (or 3340) drives would run more slowly on the 4331 than on IBM 370s. But that was a trade-off Sullivan was willing to make.

However, the emulation required to make 3340-type drives work on the 4331 CPU was a little more than Sullivan expected.

"It's the physical code that takes up main memory. We started off with 512K and when we finished [starting up] the system, just doing the bare bones of what we needed, we had 200K left," he said.

Different Access

The way one accesses data is "completely different [on the 3310s and 3340s]. On the 3310, the data access mode is Vsam and on the 3340 it's Isam. The 3310 is [also] a physically faster device. It's even faster because [on the 3340] one has this software to emulate. By eliminating the middleman [on the 3310], you pick up an extra 10%," according to Sullivan.

Sullivan admitted he went with the 3640 drives because he didn't have much choice. If he wanted to use his 4331, he needed additional memory.

In the past month, however, since the 4331 was installed, Sullivan said his overall impression has been favorable. He added he is expecting IBM's 3370 drive — a larger version of the 3310 — as one way of improving throughput.

Users of 4331 Cite Disk Drive Problems

(Continued from Page 1)

An IBM spokesman admitted there can be as much as a 30% throughput difference between the 3310 and 3340 drives on a 4331.

Possible Culprit

A possible culprit in the degradation is the absence of a rotational positioning sensing (RPS) feature in 3340 drives connected to 4331 CPUs. The RPS feature allows the drive to start reading data from the center of a disk track instead of at the beginning.

Although users concede the absence of the RPS feature is in part responsible for the 3340 disks being slower, they quickly add it shouldn't make that much difference in throughput.

Instead, the users blame the 4331 architecture as the crux of the problem.

"The story we got is when [the 3340 was used on 370s], a command was passed out to the disk drive and the disk drive controller would bring in the segment needed. If there was a 200-character record on an 8,500-character track, you would only put the 200 characters you wanted on the channel.

"[On the 4331], it's supposed to take the whole 8,500 characters and put them on the channel. IBM told me [this] would increase my channel usage by a factor of three," Donald Sevey, DP manager at O'Bryan Brothers, Inc., a Chicago-based clothing manufacturers said.

In addition to possible throughput problems, 4331 users also reported some minor operating system glitches involved with using the IBM 3340 drives.

One user said throughput goes down to almost zero when using the IBM data access method, Vsam. Another reported the remote job entry segment of IBM's DOS/Power VSE operating system sometimes leaves jobs hanging in transit. Both users, however, regarded those problems as minor, and both said IBM promised to resolve those problems in the next DOS/VSE release. That release is rumored to become available in January.

Users who installed plug compatible Memorex Corp. 3640 disk drives instead of the 3340s don't appear to be having as many problems. Although Memorex claims its 3640 drives are 20% faster than IBM's 3340, those users still report the drives run slower than they expected.

Memorex users, however, seem to have been spared some of the minor software glitches. Neither Memorex nor the users could explain that benefit, since Memorex swears the 3640 is basically the same machine as the 3340. One user theorized he was just lucky.

IBM said it hasn't experienced operating system problems on tests of its own 4331s running 3310 and 3340 drives. A spokesman theorized users' problems were localized cases. The spokesman declined to comment on a pending rerelease of VSE in January.

Unlike the 3340 users, Sevey, a 3640 user, said he was the victim of some "subtle" persuasion by IBM not to accept delivery of the Memorex 3640 or IBM 3340 drives.

Although IBM never came right out and said there would be problems with the 3340 drives on the 4331, Sevey said IBM strongly implied there might be. Other users, however, said IBM never mentioned the 3340 drives would run slower on the 4331.

"[IBM] wanted us to benchmark and that really threw a scare at me. IBM alleged that the way the 3340s worked, you would always read and write a full track, even if putting out small records. And who's going to argue with the manufacturer of the machine?" Sevey noted.

No Problems Yet

But despite IBM's indirect warnings, Sevey decided to go ahead and install eight Memorex 3640 drives. So far, he hasn't found problems with them.

"I'm just thrilled with what's happening. In the very worst case, we found a 1.8-to-one throughput improvement, and generally we're finding about a 2.5-to-one throughput improvement," Sevey said.

"I don't know what I did; that's what bothers me. Why would IBM tell me I have a problem when I can't find it? I don't see what IBM saw that caused it to be concerned.

"I honestly can't see a problem. We've run jobs twice a week for the past six years that have never run less than five hours on a 370/125. Now they run in an hour and a half," Sevey said.

"I think it was a scare, but my IBM manager told me about an account he's got that can't get as much through a 4331 as a 370/125 — it just doesn't make sense," he said.

A Chicago-based manufacturing firm has also heard of problems with 3340 drives, and it doesn't make sense to its DP manager either. The DP manager cancelled his order for a 4331 and plans to upgrade main memory on is 370/138. The manager said that measure will cost the company more, but will save some headaches and allow the company to keep its 3340 drives.

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Xerox Adds Intraoffice Net, Fellow System

By Connie Winkler
CW Staff

NEW YORK — Xerox Corp. has announced an intraoffice communications network called Ethernet and a compatible, multifunction office information system for processing text, business records and limited data.

These two products will be the "cornerstones" of Xerox's office of the future and electronic mail, and more products are planned, Xerox said. The vendor also cut prices on its current model 850 word processing system.

Ethernet, a coaxial cable strung within one office or building, is planned for the fourth quarter of 1980, James S. Campbell, president of Xerox Business Systems, said at the product announcement here Dec. 11.

Ethernet has no switching logic and is not controlled by a central computer. It simply accepts transmissions from attached system elements.

The technique was chosen for simplicity and reliability — if any one of the elements fails, the others are not affected, Campbell said.

At this point, Ethernet interconnects single-function machines such as the newly introduced 860 Information Processing System (IPS). Besides the 860 and the 850, the Xerox 9700 printer and non-Xerox products can reportedly be cunnected to Ethernet.

Ethernet can be connected to public and private networks such as the one planned by Satellite Business Systems and the proposed Xerox Telecommunications Network. It can also be linked to a host computer data base.

The 860 functionality can be changed via software entered through diskettes. It is the first information system to offer 8-in. Winchester technology fixed disks made by Shugart, a wholly owned subsidary of Xerox.

The basic 860 include a full-page display unit, keyboard printer and controller together with an operating system and text processing software. Other generic applications programs are available from Xerox as well as a Basic language interpreter that allows customized applications programs.

The basic 860 comes with 96K bytes of random-access memory. Its purchase price is $15,300; monthly rental on a one-year lease is $650/mo.

Vendor Wins OK to Sell Software to Soviet Bloc

PRINCETON, N.J. — After struggling for more than a year with federal resistance, a software company here has received government permission to export some of its products to two Soviet Bloc countries.

The action marks the first time a U.S. company has been given a license to market software to a Communist country.

The U.S. Department uf Commerce recently granted Applied Data Research, Inc. (ADR) licenses to sell separate software packages to both the City of Moscow and Bulgaria's Committee for the Unified System of Social Infurmation.

The contract with Moscow involves a computerized apartment management and distribution system to help alleviate that city's serious housing shortage; the second consists of a series of application programs geared for Bulgaria's metal industry. Bulgaria will also receive software to assist with its population census, social security records system and other administrative chores, according to Carol Cohen, ADR's vice-president and general counsel.

Although ADR petitioned the Commerce Department to grant the software export licenses, the company's strongest opponent was the Department of Defense (DOD), which claimed the software would "substantially cuntribute to [each country's] military potential" [CW, Nov. 12].

Dijkstra Slated To Talk Jan. 18

COLLEGE PARK, Md. — Dr. Edsgar W. Dijkstra will be the featured speaker at a professional development seminar sponsored by the Washington, D.C. chapter of the Association for Computing Machinery (ACM) on Jan. 18. Dijkstra will speak on the present and future role of formal mathematical techniques in prugramming.

The first of a serie[illegible]inars featuring international speakers, this meeting is being held in conjunction with the University of Maryland's Department of Computer Science. It will take place at the university's Center of Adult Education here; seating in the center is limited.

Registration fees are $40 in advance of Jan. 4 and $60 after that for members of the Washington ACM chapter, $50 and $70 for nonmembers; and $25 for full-time students. Student registration must be in advance.

More information is available from the Washington ACM chapter, P.O. 6228, Washington, D.C. 20015 or from Carolyn Johnson at (703) 827-6691.

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Rewrites of '34 Communications Act Emerging

(Continued from Page 1)

Subcommittee, but one of them — S. 611, authored by Subcommitte Chairman Ernest F. Hollings (D-S.C.) seems to be receiving most of the attention.

A key provision of S. 611 says Category II carriers (those offering toll services and "not subject to effective competition") must establish fully separated subsidiaries to produce and/or market "telecommunications equipment, information software or information services." The latest version modifies the requirement significantly. It gives carriers two years after its enactment to establish the subsidiaries, make international as well as domestic carriers subject to the requirement and changes the definition of Category II carriers.

Originally, S. 611 established a "presumption" that a carrier was noncompetitive in a particular market if it received more than one-third of the related revenue. In the revision, a carrier earning 3% or more of all intercity ("interchange") revenues is "provisionally designated" a Category II carrier, subject to a final determination within two years after enactment.

Furthermore, international carriers have to be classified as competitive or noncompetitive; this provision formerly applied only to domestic carriers.

Both versions allow state regulatory agencies to exempt small carriers from the separate subsidiary requirement, but the new draft says each state must certify to the FCC that it has adopted laws requiring separate, cost-based pricing for "telecommunications services, customer-premises telecommunications equipment, information software and information services" provided by a small carrier or its affiliate.

Addresses Specific Complaints

The latest version contains a number of other changes addressing specific complaints raised by vendors of computer systems and services, users and carriers; it thus offers some hope of ending the protracted battle over revision of the 1934 Communications Act.

For example, the original version made "all commerce in information software and . . . services" subject to FCC jurisdiction. This language, which evoked passionate oratory from vendors of on-line DP services about the evils of government intervention and the virtues of free enterprise, has now been removed.

Firms supplying on-line terminals, systems and services also have worried that AT&T, even if required to establish fully separated subsidiaries, might still be able to offer hybrid computer/-communications services subsidized by revenues from other services. The effectiveness of full separation, they point out, depends on development of a new telephone industry accounting system which clearly identifies and assigns all the expenses related to each discrete service provided by the carrier.

The original S. 611 authorized the FCC, at the commissioners' discretion, to "prescribe conditions" designed to prevent "cross-subidization and other anticompetitive practices."

The latest version of the bill is much more specific. It says that within 180 days of enactment, the commission "shall adopt regulations providing for separate pricing, on a fully compensated basis, of telecommunications equipment, information software or information services . . . offered in conjunction with a telecommunications service by any carrier not subject to effective competition; thereafter, such carriers shall provide such equipment only on an unbundled pricing basis."

Many users fear that if AT&T is forced to adopt "fully compensated" pricing for its terminals, the company will stop offering some of them. To allay this fear, the bill allows already-tariffed "customer premises equipment" to remain tariffed for at least two years after enactment of the bill.

Another change concerns standards. The earlier version authorized the FCC to "establish and enforce technical standards to protect the telecommunications network from harm and promote competition." The latest version retains this authority but lops off the reference to competition.

IBM 8100 Gets Six More CPU Options

(Continued from Page 1)

prices for its 30 series, System/3, System/32 and System/34 [CW, Nov. 5 and Dec. 10].

Internal disk capacity for the 8140Bs ranges from 58M bytes to 123M bytes. The processors use double-spindle disk storage, a technology not available on earlier models, IBM said. The internal disk storage on the previous models was 64M bytes.

Moreover, 131K bytes of fixed-head disk capacity are standard on the latest processors. These processors will use 16K-bit memory chip technology instead of the 3K chips used previously, the spokeswoman said.

Although the latest processors will not entirely replace the older 8140s, IBM has already put the older models into "limited new production," she noted. This means IBM has the option of producing 8140As using some reconditioned parts.

Shipments of the 8140Bs are scheduled to begin during the fourth quarter next year. Depending on the main memory and disk storage options chosen, their purchase prices range between $51,610 and $73,020.

The purchase prices, monthly lease on a two-year plan and rentals are:

- A B51 with 512K bytes of main memory and 58M bytes of disk storage costs $51,610, leases for $1,480 and rents for $1,739.
- A B52 with 512K bytes of main memory and 123M bytes of disk storage costs $61,520, leases for $1,755 and rents for $2,062.
- A B61 with 768K bytes of main memory and 58M bytes of disk storage costs $57,360, leases for $1,640 and rents for $1,927.
- A B62 with 768K bytes of main memory and 123M bytes of disk storage costs $67,270, leases for $1,915 and rents for $2,250.
- A B71 with 1M byte of main memory and 58M bytes of disk storage costs $63,110, leases for $1,800 and rents for $2,115.
- A B72 with 1M byte of main memory and 123M bytes of disk storage costs $73,020, leases for $2,075 and rents for $2,438.

Field Upgrades

Field ongradability for the 8140A is limited to increases in main memory. The technology for disk storage will remain the same allowing the attachment of four 8101s to the processor.

An 8140A configured with 512K bytes of main storage, 58M bytes of disk storage and 131K bytes of fixed-head disk storage will cost $47,700. The same configuration with 768K bytes of main memory costs $56,550 and with 1M byte costs $63,020.

Field upgrades will be made during the first quarter of 1981. Users with orders for the 8140A who want to change them to B models will not have to sacrifice order position, but will obtain an order position for the new models "relative to their former position," the spokeswoman explained.

Increased Communications

IBM also announced the 8140Bs will offer increased communications capability. All B models come with three communications ports as a standard feature, with the capability of accommodating two communications options, each consisting of four ports.

If a floating-point feature is desired, users must sacrifice one option, IBM said.

Prior to this announcement, only three of the 12 8140 models offered communications ports. Each four-port option costs $400 or $11/mo on a two-year lease and $13/mo on rental. The floating-point option costs $4,080 to purchase, $115/mo on the lease plan and $135/mo to rent.

Unlike the 8140s, the 8130 processors have not been revamped. These processors will continue to use 64K-chip memory technology, and upgrades are limited to memory enhancements. Users can add up to three 256K-byte increments of main memory; each increment costs $4,500, IBM said.

Depending on the amount of processor memory and disk storage specified, upgraded 8130s will cost between $24,000 and $26,160 to purchase. Two-year lease charges will range from $600 to $660/mo and rentals will cost $705 to $776/mo.

Shipments for units with 768K bytes of main memory will begin in the fourth quarter of 1980. Units with 1M byte of main memory will be shipped during the first quarter of 1981.

IBM also introduced a dual spindle storage device and upgraded other storage and I/O devices.

The 8101 A25, the dual-spindle disk storage unit, has a capacity of 123M bytes and sells for $26,320, leases for $721/mo on a two-year plan and rents for $847/mo.

The 8101 A23, a 64M-byte disk storage unit, replaces the A11, a 29M-byte unit. IBM has already given the customary 90-day notice for withdrawing the A11.

The A23 sells for $16,410, leases for $446/mo on the two-year plan and rents for $524/mo.

The 8101 A20 I/O device is a new version of the 8101 A10. It costs $5,000, leases for $148/mo and rents for $174/mo.

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Non-DPer Gets Lots of Help Making Decisions

By Tom Henkel
CW Staff

How does the non-DP. executive make technical decisions? With a lot of help.

That's how one such executive, Joe Carr of American Can Corp., handles tough DP decisions. By using a team of five lower level managers who are better versed in systems and more in tune with each department's needs, Carr claims he is better off than most DP managers who often find themselves single-handedly making hardware decisions.

"I run the business with the [team of advisors]. So the guy who's responsible for long-term direction in data base and information management participates along with the guy who makes technical decisions on hardware.

"And he has to live with — and get the support of — the guy who has to develop the data base environment. [And all those people] have to live with the guy responsible for maintenance and throughput on development," Carr noted.

When the final OK is given to purchase equipment, it's usually something that everyone can live with, justifiable to top management as well.

American Can recently decided to upgrade its operation to an IBM 3033 CPU. By using the team approach, Carr said, American Can got a system that meets individual departments' needs, but will also interface with 17 American Can subsidiaries, he said.

Since American Can makes its development decisions on five-, three- and one-year levels, the 3033 will tie in with long-range plans to develop a telecommunications network from the 3033 host to other field hardware, Carr explained.

"The test for what we need is not me — it's the demonstration that we put up new applications, and our volume has gone up to prove we need them." Final approval for the new system had to come from the American Can board of directors, Carr said.

"Data processing is a piece of what we do. A decision to buy a computer should be no greater or less than the kind of decision to put capital into a new plant."

But the biggest asset Carr finds to help him make technical decisions is a vague gut feeling called trust. It is Carr's confidence in the advice he gets from his operating committee, or advisory team, that lets him go to the top brass feeling confident a proposal for a new system or piece of hardware is justifiable.

DP Chief a Businessman

(Continued from Page 1)

But for the DPer, crossing one of Carr's bridges may look more like walking a tightrope in a hurricane.

"We look for people who don't necessarily think the system is the solution — people who are capable of understanding the dimensions of a business problem. If a computer system is the answer — great. But in many cases the computer isn't" he said.

When hiring a businessman, it's all business for Carr. "First, we look for a person whose concern is understanding the strategy of our business; second, someone with sufficient background to understand the systems implication of that strategic direction; and third, a person who can communicate those requirements to the technical side of our organization.

Chilling Scenario

Where does that scenario leave the heavy DP type? Although Carr claims it's anything but out in the cold, many DPers may feel an unpleasant chill.

For the DPer looking to shift to the business camp, it's an uphill grind. Top management at American Can doesn't seek out qualified DPers for management positions — they have to fight for it. And according to Carr, the competition is sometimes pretty stiff.

If the DPer aspiring to the executive's chair doesn't make it, however, it's his own fault, Carr said.

"If the DP guy looks at himself as being somehow different from other executives because he's surrounded by the mystique of the computer — he's never going to make the transition. It's the guy who says 'look, I have to understand what makes my company tick and make my decisions in that light' who's going to make it, because he's a businessman before he's a technician," Carr added.

At American Can, the top brass makes every effort to leave the doors to executive offices unlocked to DPers. The catch is, DPers must make the move to open the doors, Carr noted.

To overcome a sometimes lopsided rating system for executive-bound DPers, American Can is offering company-supported business programs — some can culminate in an MBA — and business-oriented training through specific company projects that key on a DPers' technical skills to build an understanding of the business.

"There are a great many opportunities for people to advance and develop managerial skills.

"We don't have a magic formula. When we see people with basic talent, [who can] perform on a project, there's usually an opportunity for that person to move into a position in business," according to Carr.

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FAA Defends Length of Its Acquisition Process

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. – The Federal Aviation Administration (FAA) has been continually criticized in recent congressional hearings for not moving faster to replace the antiquated IBM 9020 computer systems now in use at the 20 U.S. Air Route Traffic Control Centers.

New computers, scheduled for installation in the mid-1980s, will be obsolete before they are in operation because the FAA is taking so long to procure them, agency critics have charged.

In hearings before the House Aviation Subcommittee last week, however, FAA Administrator Langhorne Bond strongly defended the lengthy acquisition process, already under way for two years. He argued that because the systems are so essential to air traffic safety, they must be phased in very carefully and only after the hardware and software are thoroughly tested and approved.

Because the existing air traffic control systems must be kept up to full operational capability, the transition to new computers "must be made in a manner that the controllers do not require a significant amount of retraining, and the phaseover to the new system must be transparent with no immediate major changes in operations or procedures," Bond said.

The many dimensions of what Bond called probably "the biggest computer project ever undertaken" require "careful planning and execution. It's a large, complex order, and I'm confident we're going about it in the correct manner."

'Not the Solution'

"I am aware," Bond continued, "that there are some who claim we should move right now and buy off-the-shelf computers and get on with this improvement program .... That is not the solution.

"Our existing computers ... were the latest when we began procurement in the early 1960s," he said. "Our software programs ... were designed for operation on the then-available systems, but are they the programs one could install today to provide for efficient operation into the 2,000s or even the 1990s? The answer is no.

"Technology has opened entire new vistas upon which we can build to meet reasonable future needs. Is there technology available that we could use to translate our existing software programs into a new form that would be used on new computers? Yes, we believe so. But we'd still have basically a 1960 vintage program that just is not adaptable to the world of the 1990s and beyond.

"Therefore, we cannot see any immediate means to implement a system capable of transitioning into the 1990 era," argued Bond, adding that "we therefore are now conducting a program that will get us there as fast as possible without disrupting the services we are providing.

"We must phase in new equipment perfectly with no system failures at all," Bond said. He also blamed cumbersome government procurement regulations for some of the delay in obtaining new air traffic control systems.

"We find ourselves always a little bit behind the leading edge of technology," but the FAA will soon have to decide at what point to "freeze the technology" it will eventually procure, Bond concluded.

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Controllers Reject Blame for Near-Miss

By Marguerite Zientara
CW Staff

LEESBURG, Va. – While Federal Aviation Administration (FAA) investigators put the blame for a near mid-air collision over North Carolina Oct. 31 on "controller error" and not on a computer failure at the Air Route Traffic Control Center (ARTCC) here, the controllers have a very different interpretation of the incident.

Referring specifically to the Oct. 31 near-miss over North Carolina, one controller described the confusion in the control room at the time: "I assumed the handoff position ... without a briefing because the digitized radar had failed, and the radar controller was extremely busy trying to revert to broadband radar.

"There were not enough 'pips' or grease pencils around, and the radarscope was difficult to get down and locked. It finally took three of us to get the scope into the locked position.

"Jacksonville's continuous calling on the handoff line was very distracting," he recalled. "Our efforts to identify aircraft by identing was difficult." (Identing refers to the entering of aircraft identification data into the computer manually, to reestablish data blocks.)

'No Broadband, No Narrowband'

"Sometime before we had completed the conversion to broadband, we were told to return to narrowband," the controller went on. At that time he accepted a manual handoff from Jacksonville.

"I remember initially seeing tracks all over the [radarscope], some were flashing to us, some were not." Flashing tracks signify an aircraft that is ready to be handed off from another ARTCC.

"Somewhere in all this madness, we lost our entire presentation. No broadband, no narrowband. I don't know exactly when, but it lasted about 20 to 40 seconds.

"In between all of the above," he told the FAA, "I was making and taking handoffs, marking [flight] strips and trying to get the [airspace] sector back into some order. My first knowledge of [Flight 721] was when he called, complaining of traffic, and the radar controller asked his position."

FAA Blames Raps on Union 'Squabbles'

(Continued from Page 1)

puter and radar systems that back the air controllers. He said a recent FAA directive to the centers not to release computer failure information was issued so the Washington office could ensure that the competing organizations were given equal access to accurate information.

A similar FAA claim before the House Ways and Means Subcommittee last month prompted several congressmen to denounce the agency for censorship [CW, Dec. 3].

In a strongly worded defense of his agency, Bond told the Aviation Subcommittee last week that Pass was incorrect in its complaint that FAA cutbacks in on-site computer maintenance at Air Route Traffic Control Centers in favor of remote diagnostic procedures will significantly delay critical repairs to the centers' computer and radar equipment. Bond termed the Pass actions "shameful feather-bedding" by an organization trying to protect its members' jobs in the face of increased FAA automation.

Falsified Reports Charged

Bond's testimony was in turn challenged by Fasta Executive Vice-President Stanley Q. Lyman, who said the FAA is falsifying control center reliability reports to justify continued cuts in field maintenance personnel. He referred to a June 1979 FAA order calling for a reduction of 2,000 electronics technicians over the next 10 years.

In addition, Lyman said, "the FAA [has] plans for 524 new traffic control and air navigation facilities in fiscal year '80, [which] will increase the work load of the field electronics personnel by at least 234 employee years. Despite this significant work load increase, the FAA requested 202 fewer field electronics positions than were authorized for FY1979."

A Bond statement that increased FAA use of solid-state equipment means the agency will need fewer on-site maintenance personnel was challenged by Lyman, as well as by Rep. Bob Whittaker (R-Kan.), who also testified before the subcommittee.

"Mr. Bond made quite a point of downplaying computer outages and air safety problems and described 'moves to solid-state equipment' as the way to solve the FAA's problem with computer breakdowns and other equipment problems," Whittaker noted in a statement issued after Tuesday's hearings.

"Quite simply, his testimony does not hold up to public scrutiny. The computers the FAA are now using are made up mostly of solid-state components and yet there are over 20 outages a day," said Whittaker, whose office has conducted an independent investigation of air traffic safety.

"Further, since the FAA insists that over 70% of these outages are caused by hardware problems, this indicates that solid-state equipment is not the cure-all that Administrator Bond would have the committee believe."

Bond Stands Firm

Despite the fact that Whittaker's concerns were echoed by every congressman public witness at the hearing, Bond maintained that "our air traffic control system is the best in the world" and the "safest in the world."

Bond also defended the FAA procurement program for new computer equipment – a $1.5 billion action scheduled for completion in 1985 (see story above).

Bond received some backing from the vice-chairman of the National Transportation Safety Board, Elwood T. Driver, who told the subcommittee that "from our experience in accident investigation, we feel the present air traffic control system is characterized by a high degree of safety."

However, Driver said, "we perceive the concern expressed by controllers regarding [hardware] outages to be a genuine concern since the controllers are the ones who must make the system work. Their expressed concerns become our concerns."

Jets Almost Collided

Controllers, Not Computer, Cited in Near-Miss

By Marguerite Zientara
CW Staff

LEESBURG, Va. — The near mid-air collision of two passenger jets being controlled by the Air Route Traffic Control Center (ARTCC) here on Oct. 31 resulted from "controller error" and not from a computer failure, according to the Federal Aviation Administration's (FAA) Eastern Region Air Traffic Review Committee.

The incident, in which two passenger jets flying over North Carolina came within 300 feet of each other [CW, Nov. 12], occurred moments after the failure and recovery of the center's air traffic control computer.

Three investigating bodies — the center's Facility Review Board, Facility Chief Angelo Viselli and the Regional Review Committee — concurred that the direct cause of the incident was one controller's "failure to radar identify and maintain the identity of [Air Florida Flight 721] prior to issuing a descent clearance to [Delta Airlines Flight 1061]."

Both Viselli and the Regional Review Committee found that the "initial contributing cause" of the incident was a second controller's failure to advise his colleagues that he had allowed the Air Florida jet to enter Leesburg's airspace withoiut accepting a radar handoff from the Jacksonville, Fla., center.

The controller's acceptance of the aircraft without a radar handoff resulted in the absence of an alphanumeric data block associated with Flight 721. Such a block normally indicates the plane's airline and flight number, ground speed and altitude, according to Robert J. Adams, president of the local Washington chapter of the Professional Air Traffic Controllers Organization.

The computer failure and subsequent transitions from narrowband to broadband and again to narrowband caused confusion in the control room, Adams said. Adding to the confusion were controllers' attempts to reidentify traffic within the sector by radio communication with pilots, as well as Jacksonville's handing off of three aircraft simultaneously, Adams explained.

Because of all the chaos, Flight 721 "just got lost in the shuffle," he said. "No one has really determined just how that occurred."

Contrary Findings

Only the Leesburg Facility Review Board found that the failure of the center's IBM 9020E computer minutes before the incident was the initial contributing cause of the near-accident, "changing a moderate, routine flow of traffic into a complex situation due to the added workload requirements," according to its report.

Contrary to that finding was a statement from Viselli: "While consideration and genuine concern must be given to the added complexity factor induced by computer failures, added concern must also be expressed at deficiencies noted by the [Facility] Review Board which indicate a low level of proficiency by the sector controllers in following established procedures while in a complex broadband/narrowband transition situation.

"Controllers are expected to follow appropriate procedures while providing radar separation and services in either the broadband or narrowband radar environment."

Contributing Cause

Another contributing cause cited by the Facility Review Board but denied by the Regional Review Committee was the Jacksonville Center's retraction of the automated handoff of Flight 721 prior to Leesburg's acceptance of it. That caused the disappearance of Flight 721's alphanumeric data block on Leesburg's radarscopes.

While the Facility Review Board blamed that situation on Jacksonville, the Regional Review Committee felt "controller action" was lacking.

While Adams agreed that the controller "should share responsibility with the computer" for the incident, he said. "We still maintain that if the computer hadn't gone down, this incident would never have occurred."

'Confusing Situation'

Citing the series of events that added to the "confusing situation," he noted also that there was a malfunction in the lowering device of one of the radarscopes, as well as a loss of both broadband and narrowband radar for 20 to 40 seconds.

The 400-pound radarscopes must be lowered from a vertical position to a horizontal position when computerized narrowband radar goes down. This allows controllers to write identifying information on slips of paper and move them along the scope to correspond with radar blips.

As a result of the incident, Viselli plans to present the Facility Review Board's findings to the controllers involved in the incident as well as provide them with 40 hours of remedial training "for the purpose of correcting the specific deficiencies identified" in the committee's report.

Viselli has reviewed controllers' recommendations in connection with the incident and sent them to the center's Evaluation, Proficiency and Development Officer "for comment or action."

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GTE to Offer Innovative Network Services

By Phil Hirsch
CW Washington Bureau

NEW YORK — General Telephone & Electronics Corp. (GTE) announced formation of a new Communications Network Systems Group here last week: It will market a raft of innovative voice and data services. The major emphasis will be on packet-switched data transmission, digitized voice and interactive data base services, utilizing Viewdata technology.

GTE's recently acquired Telenet subsidiary will nearly triple the reach of its present packet-switched network by mid-1080 to encompass 250 central offices serving a total of 400 cities. In addition, Telenet's transmission speed will be increased significantly, reducing transit time through its network from 200 msec to 50 msec.

The higher speed will be produced partly by using communications satellites, beginning in 1981. New broadband local distribution facilities are also planned. They will employ packet radio transmission, T1 carriers and Telenet provided local switching in place of telephone company provided facilities. Meanwhile, Telenet is planning a new store-and forward electronic mail service, the first of a family of offerings that will include high-speed facsimile.

GTE was less specific regarding the other services to be offered by the new Communications Network Systems Group. For example, while the group's president, Roger P. Vallo, reported that Viewdata is being "evaluated for a market test next year," there are "no plans" yet to offer a commercial TV service. (Viewdata provides data base access and retrieval via voice-grade telephone lines to users equipped with commercial TV sets or CRT terminals).

Voice Offerings

The voice offerings of the new marketing group will consist of private networks for business customers that feature a new — but already-announced — line of digital (pulse code-modulated) PABXs. "In addition to conventional voice communication," GTE Chief Executive Officer Theodore F. Brophy pointed out, these networks "can also include data communications for financial information, time-sharing and accessing data bases, and facsimile for engineering drawings, charts and other graphics."

This is an indication that the new PABX equipment is being groomed to process both voice and data signals.

Brophy also indicated that formation of the new marketing group signals a decision by GTE to devote more resources to competitive telecommunications services. "The world market for telecommunications will more than double by the late 1980s," he pointed out, adding that "certain markets such as data will grow much faster, probably by at least 20% annually." Brophy estimated that by 1987 the "U.S. business communications market" will be worth more than $26 billion."

Four Forces for Change

This anticipated market growth represents one of four "major forces for change" that have created significant opportunities for the new GTE group, Brophy said. The others: advancing technology, "the growing importance of communications as a substitute for energy" and the regulatory environment.

Regarding the latter development, Brophy predicted that "by the end of the next session of Congress (late next year), there will be legislation making specific, necessary changes in the Communications Act of 1934 — changes that will encourage technological innovation while . . . ensuring the preservation of our integrated national telephone network . . . ."

GTE is clearly counting heavily on its Telenet subsidiary to provide the company with a competitive edge during the next decade. Aside from nearly tripling the reach of the present Telenet network, plans call for developing packet interfaces for "virtually all of the data terminals now in general commerical use," GTE Telenet President Larry Roberts said. Specifically, he mentioned interfaces for 3270-type CRT units, 2780 remote job entry and Hasp devices. "We are also working with office equipment vendors to develop packet network interfaces for the new generation of intelligent office equipment, such as digital facsimile units, communicating word processors, intelligent copiers and other devices that will make the office of the future," Roberts said.

Until recently, he added, "public packet networks were limited primarily to communication between computers and lower speed terminals in the 75- to 1,200 bit/sec range." The new interfaces, which will begin to be added to GTE Telenet's network next year, will allow communications at speeds of 2,400 bit/sec to 56 kbit/sec.

Roberts also reported that the new electronic mail systems will service Mailgram and Telex users as well as those employing leased-line access.

Satellite Transmission

The new broadband satellite transmission system to be introduced in 1981 will initially serve 30 cities through five-meter-diameter earth stations; later, if sufficient demand develops, stations will be installed on users' premises.

Telenet will employ a modified time-division-multiple-access scheme to control traffic on the new satellite facility. The chief novelty is that the down-link is not time sliced. Instead, all messages are transmitted to all receiving stations. Each station then automatically selects the packets bearing its destination address.

GTE's new Communications Network Systems Group will consist of three major subdivisions — GTE Telenet (offering packet network services, public and private, domestic and foreign); GTE Telecommunications Systems (private voice networks) and GTE Information Systems (data base services, including Viewdata).

GTE telenet will work closely with Cambridge Telecommunications, Inc., another recently acquired GTE subsidiary.

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Extra Benefits Seen From Xerox, SBS

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Telecommunications users should gain some special benefits from the new networks being developed by Xerox Corp. and Satellite Business Systems (SBS), a well-known French computernick said here recently.

His basic point was that the traditional carriers, fearing a loss of revenues, have been reluctant to compress the customer's transmitted data, to permit sharing of access ports, to allow a circuit to be used for more than one type of transmission or add similar cost-cutting features to their services.

Xerox and SBS, however, are willing to earn a smaller return on their communications services if, in the process, they can sell more Xerox and IBM terminal systems, according to Louis Pouzin, director of pilot projects at IRIA, a French computer research institute. He spoke to the Special Interest Group on Data Communications (SigCom) of the Washington, D.C., chapter of the Association for Computing Machinery (ACM).

Although a number of public data networks are being built in Europe, and some facilities are already operational, their user appeal is limited because of high rates, obsolete technology and some other problems, Pouzin reported.

France's Transpac network has been operational since December 1978, for example, but the charges are three times higher than Telenet's, partly because access ports can't be shared. Another packet-switched network is Euronet, which interconnects France and six neighboring countries. But Euronet charges are approximately double Transpac's rates, Pouzin said.

Furthermore, Euronet does not have its own marketing force. Instead, it relies on the telecommunications authorities in the participating countries, which, according to Pouzin, aren't particularly eager to sell the service.

The first European packet-switched network was built by Spain early in the '70s. Originally used exclusively by Spanish banks and large companies, this network is now accessible to the public. But the service is limited to asynchronous terminals, and packets are transmitted only among network nodes rather than end-to-end, Pouzin said. England's Experimental Packet-Switched System (EPSS) is also handicapped by obsolete technology, he added.

In Germany, the Bundespost (the national telecommunications authority) has largely ignored packet-switching. The main German public data network is a circuit-switched system called EDS, which has a maximum transmission speed of 9.6 kbit/sec.

Popularity Growing

The popularity of packet-switching is growing, however, Pouzin reported. The Dutch, British and Swiss all have systems on order, and even the Germans appear to be looking seriously at the new technology. They're experimenting, in Berlin, with a "Datapac" switching node acquired from Bell Canada. Meanwhile, Canada's other major carrier, CNCP, has ordered hybrid packet/circuit-switching equipment from Siemens' U.S subsidiary.

Presages Change

Pouzin believes this latter development may presage a change within the parent company. The Bundespost leans heavily on Siemens for technical advice, he added.

Until the carriers offer better terms and conditions, however, the impact of the new networks will be limited, Pouzin said. Aside from high rates, there are numerous other limitations. A data base in one European country isn't generally accessible from a neighboring country, for example. As a result, many Europeans subscribe to U.S. data base retrieval services. But it's expensive because European postal, telephone and telegraph authorities are reluctant to lease circuits to providers of on-line services which can be shared by their customers.

At U.S. vs. IBM Antitrust Trial

IBM Disk Products Innovative, Engineer Says

By Connie Winkler
CW Staff

NEW YORK — How revolutionary or innovative are IBM's disk products? This was the question raised by the recent testimony of Kenneth E. Haughton, an IBM engineer, in the U.S. vs. IBM antitrust trial here.

"I know of no innovations by other people," Haughton said about IBM's work with disk drives and disk control units. In cross-examination, however, Justice Department lawyer Mark W. Gaffney suggested that some of the innovations Haughton described may have come from other sources.

Involved in disk development at IBM's San Jose lab from 1957 to 1977, Haughton now heads IBM's Office Products Division development lab.

Basically, he described as innovations all IBM disk products from the 350 Ramac announced in 1956 and shipped in 1957 to the 1301, 1311, 3330, 3340 Winchester and 3350 fixed disk announced in 1975.

An innovation is the "conception of novel solutions to problems and reducing those solutions to practice. One may have innovative ideas, but unless they introduce them into the business world they haven't fully innovated," Haughtun said.

IBM "had introduced this revolutionary idea of a disk drive just shortly before I joined the company," Haughtun said about the 350 Ramac. This first disk product was a stack of 50 disks two feet in diameter and was shuwn on one of the many charts Haughton, a former professor, drew for the court.

The Ramac concept of increasing the volumetric efficiency of data storage on disks as opposed to drums was innovative, as were randum access to any record and an access mechanism to get frum une record to another, the engineering Ph.D. said.

Floating Heads

Haughtun told how IBM used compressed air to support the read/write heads in Ramac and subsequently improved those heads in the 1301 (announced in 1961 and shipped in 1962) with slider bearings. Gaffney introduced a 1956 *Computers and Automation* article which described the use of compressed air to support read/write heads un magnetic drums. Haughton said the magazine was reporting on a laboratory model and there was no indication the project had reached fruition.

Regarding those hydraulic air bearings, slider bearings, Gaffney introduced a 1957 *Datamation* article describing development work on air-floating heads at Autonetics, a division of North American Aviation, Inc. The Justice Department noted that several IBM employees at the San Jose lab had come from North American.

The witness said there was a consortium of companies working on such floating heads.

In 1969, Haughton became manager of the IBM Winchester disk development program, which resulted in the 3340 Winchester disk drive and 3348 data module. Winchester drives, most importantly, had two low-mass, low-load heads per disk that could start and stop in contact on each disk as well as servo systems that would self-correct problems within tbe disk, he said.

Track density had increased by 20 on the Ramac to 300 on the Winchester and from 350 byte/in. on the Ramac to 5,625 byte/in. on the Winchester.

The government countered with an IBM agreement which noted: "It is important that the existence of this agreement be kept IBM CONFIDENTIAL until further notice." The agreement was a $50,000 cross-license with Data Disc, Inc. for low-mass, low-load heads which Haughton said Data Disc introduced as video refresh buffers.

IBM had a contract with Rand Corp. to develop a disk file using Data Disc heads, the witness said.

The Data Disc heads did not contradict his testimony that IBM's 3340 low-mass, low-load heads were innovations, Haughton contended. "The Data Disc file was not a digital file. It did not have accessing arms and there was a reliability issue with those heads . . . We had to improve their reliability to get them to the point to be commercially available," he told the court.

Haughton presented what he called the New Attachment Strategy for disk drives implemented with the 3330, which separated the disk control unit, putting the power supply in some CPU's and device-dependent functiuns in the disk drive. He called the 2319A a "precursor" to the 3330/3380 new attachment strategy.

Correction

In the recent story on the failure of an uninterruptible power supply (UPS) at the Chicago Board of Trade [CW, Dec. 3], Information Systems Manager Bob Jirout was incorrectly quoted as saying the failure didn't cause serious problems. Jirout actually said the UPS failure didn't cause serious problems with the computer files; the suspension of trading was a serious problem.

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Faced With More Than 90 Forms

User Builds 'DMS' Screen-Editing Capability

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — Hampered by IBM's failure to provide its Display Management System (DMS) with a built-in screen-editing capability, the Loma Linda University Information Systems Department decided to do the job itself.

Department staff first identified the types of editing capabilities they needed and coded the features in assembler language to form a custom-written "generalized edit" program. They then added the program to an "empty slot" that DMS — an IBM software package for defining CRT terminal screens — reserves for user-written "supervisory functions."

The result was a modified DMS that, unlike IBM's standard product, provides 13 integrated screen-editing functions. Some of these features include table lookups, Vsam file lookups, verification of entries as numeric or alphabetic and identification of required entries.

Today, the user-written DMS module is operating at the Loma Linda University Medical Center, a teaching hospital, where it forms part of an IBM 370/158 system that performs two main applications — the maintenance of patient records and the collection of student data files.

Helen Beach, a member of the university DP department's programmer/analyst staff, credited the revised software packages with streamlining and speeding the procedure for editing the more than 90 CRT-displayed forms used in the system's two big application. The student records portion of the system requires 80 such screens for presenting details like grades and classroom schedules, while the patient data portion uses standard screens for displaying medical histories and other information.

With the help of fellow programmer/analyst Brent Holm, Beach described the main features of Loma Linda's generalized edit program at a DMS Users Group meeting here last week.

The program, whose code took an estimated two months to write, was developed and implemented about two years ago by Beach's husband Ronald, then the university DP center's data base administrator.

Before the Loma Linda computing center switched to its generalized edit program, the installation edited its display screens by writing regular CICS progams in Cobol. But the site eventually had to abandon that practice when it found it could no longer afford to take the time to write a separate CICS program for each of its 91 standard screens.

Scheme Developed to Help Police Bolster Crime-Reporting Systems

By Jeffry Beeler
CW West Coast Bureau

SACRAMENTO, Calif. — A recently designed scheme for collecting and managing data has already helped three U.S. police departments find and correct deficiencies in their crime-reporting systems, and scores of other law enforcement agencies are said to be at least considering the concept.

Nicknamed the Standardized Crime-Reporting System (SCRS), the scheme is described in a series of four manuals due to be released soon by the Search Group, Inc. (SGI), a local nonprofit research organization specializing in the criminal justice field.

Together, the four volumes will serve as a model that will reportedly aid small and medium-sized police departments in implementing new crime-reporting systems, upgrading existing ones and converting from manual to computer-based operations.

In particular, the model will specify what types of data an effective crime-reporting system should include and how that data should be managed and used, according to SGI project coordinator Jane Duncan.

Tested at Five Sites

Since the completion of its design in 1973, the SCRS has undergone extensive debugging at five user test sites. But because the system is as applicable for manual procedures as for on-line operations, only three of the test sites are computer-based.

Those three installations include the North Las Vegas, Nev., New Jersey State and Bellmawr, N.J., Police Departments, Duncan said.

Although no additional SCRS installations are planned at present, many prospective customers have already expressed an interest in the model, she added. During the last six years, SGI has received an estimated 200 inquiries from police forces throughout the U.S.

Earlier this year, the research organization completed the testing phase of its SCRS development and began writing the system's four volumes of documentation. The first volume, entitled the *SCRS Implementation Guide*, has already appeared; the next two manuals are slated to be issued in January.

The final volume, which will cover report writing under SCRS, is expected to appear sometime during February.

Swamped by Growth

SGI developed the SCRS model after its research in the criminal justice area revealed that many crime-reporting systems have become swamped by an explosive growth in user demand, Duncan said. The heavy strain on such systems has resulted in inadequate management controls and in the inability of many police departments to meet their management reporting needs.

Integrated Functions

To minimize these difficulties, SGI designed its model to integrate all three major functions of a crime-reporting system: data collection, data management/control and data use.

The data collection portion of the model embraces all 66 of the data elements SGI officials consider necessary for a comprehensive crime-reporting system. Some of these elements include suspect's name, physical description and an explanation of his alleged offense.

Bombay Scheduled as Site Of Communications Meets

BOMBAY, India — Networks 80, an international symposium on data communications and computer networks, will be held here Feb. 4-6, followed directly Feb. 8-11 by the annual convention of one of its co-sponsors, the Computer Society of India.

Immediately preceding the symposium, on Feb. 2-3, will be a two-day course for attendees who have a basic knowledge of data communications concepts but would like advice on planning communications facilities in a commercial or scientific environment.

Sponsored by the Computer Society of India in collaboration with Technical Committee 6 of the International Federation for Information Processing, the main symposium will include demonstrations of several international networks.

Topics to be discussed include "Planning for Data Communications: Constraints and Resources in India," "Design Prinicples of Communications Protocols" and "Data Security in Computer Networks."

Registration Data

Registrations must be filed no later than Dec. 31. The fee for the course on data communications is 600 rupees and the Networks 80 symposium costs 750 rupees; the fee for both events is 1,000 rupees.

The sixth and following delegates from one organization will be charged only 600 rupees for the symposium.

More information is available from Networks 80, c/o Computer Maintenance Corp. Ltd., World Trade Centre; Cuffe Parade, Bombay 400 005, India.

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So it looks like IBM will have to stay compatible, or else.

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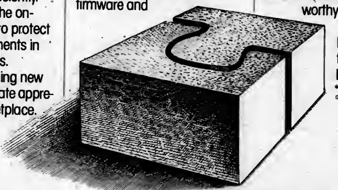
* Datapro Research Corporation's annual survey 1979



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Debugging Your Writing

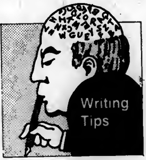
Ruth Schiff Winett

The tennis lessons have ended, and the would-be Billie Jean Kings and Jimmy Connors are now so self-conscious about their serves (Are their positions correct? Their tosses straight?) that they can no longer get their serves over the net, let alone into the right court.

This is the last in a series of 12 articles on better writing.

Those of you who have become apprehensive about your writing as a result of reading this series of articles should be encouraged. You can write good papers and memos if you do enough prewriting and rewriting.

However, you can become a good tennis player or a good writer only by playing tennis or by writing and learning from your mistakes.



The following checklist, which is divided into two sections, the message and the method, should help you analyze your papers. The list is fairly comprehensive; don't expect to master every area immediately.

I. The Message [" 'Prewriting' a Must for Good Technical Prose," CW, Oct. 1]

A. Purpose
Have you achieved your purpose?
Did you say what you intended to say?

B. The Paper
Is your paper unified? Does it center around a single major idea (thesis)?
Do you explore your topic as fully as possible?
Do you use concrete details and examples to support your thesis?
Do you avoid going off on tangents?
Do you introduce your subject in an interesting fashion?
Do you end with a summary or conclusion?

C. The Paragraph
Does each sentence have a topic sentence? (A topic sentence is to a paragraph as a thesis sentence is to a paper.)
Is each paragraph unified aroiund a central idea?
Is each paragraph (each subpoint) fully developed?
Have you avoided excessively long and excessively short paragraphs?
Is the sequence of ideas within each paragraph logical and orderly?

II. The Method

A. Tone
Have you kept in mind the background and interests of your reader?
Have you maintained a consistent attitude toward your reader?
Have you maintained a consistent attitude toward your subject matter?
Have you been as objective as possible?

B. Point of View ["Are You Listening, Gloria Steinem?" CW, Nov. 5]
Have you maintained a consistent point of view (first, second or third person, singular or plural)?
Have you avoided sexist expressions?

C. Organization
Is the organization logical? (By quickly outlining your rough draft again, you can ascertain if the paper needs reorganizing.)

D. Transistions ["Transitions: The Elmer's Glue of Writing," CW Oct. 22]
Do you employ transitional devices such as the following to help your readers shift mental gears:
Repetition of key ideas and key words?
Use of transitional sentences and expressions?
Use of pronouns with antecedents in earlier sentences?

E. Sentences ["Can Your Sentences Pass the 'Yes-No' Test?" CW, Oct. 8, "Boy Sees Explosion Doing the Hustle," Oct. 15, "The Spice of Life," Nov. 19]
Are your sentences complete? (No fragments, no run-ons)
Are your sentences varied in structure and length?
Are your sentences clear so your reader knows who or what is doing what?
Have you eliminated all dangling modifiers, all unnecessary passive constructions and all awkward expressions?
Have you made all sentences which are parallel in content parallel in style as well?

F. Diction ["Le Mot Juste," CW, Dec. 3]
Have you eliminated all unnecessary words? (More is not necessarily better.)
Have you included all necessary words?
Have you avoided cliches?
Have you used the correct form of each word?
Have you kept the use of technical jargon to a minimum?
Have you avoided the awkward repetition of sounds?
Have you used idiomatic expressions correctly?
Whenever necessary, have you checked the dictionary for word meanings?
Is your vocabulary appropriately formal or informal?

G. Mechanics
Have you checked spelling (possessives, plurals, word division and capitalization)?
Have you checked punctuation?

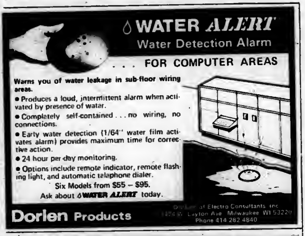
H. Grammar ["Yes, We Have No Bananas" CW, Nov. 12]
Do your subjects and verbs agree?
Have you used the correct verb tense?
Have you avoided double negatives and confusing positive negatives?
Is it clear to what or to whom your pronouns refer?

In conclusion, when you write a paper, it is helpful if you allow sufficient time for prewriting and rewriting. Furthermore, if you allow enough time to put your article on the back burner for a day or so, you will subsequently view it more objectively. You may find it useful when you return to your paper to read it aloud.

In any case, you will find it necessary to go over your paper several times before you feel confident that all of the bugs have been removed.

However, if you consistently follow the above suggestions, and if you consistently practice your serve, your writing skills will develop — and so will your serve.

Winett teaches "Essentials of Writing" at Framingham (Mass.) State College.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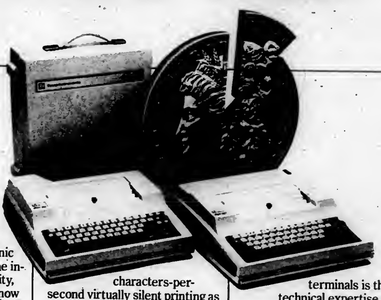

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Centralized Approach Disputed

Federal Flood Information System Under Fire

By Jay Woodruff
CW Staff

WASHINGTON, D.C — A $16.9 million computerized flood information service that has been funded by the federal government could have been set up and run by private businesses at no cost to the government, according to Sen. Howard Metzenbaum (D — Ohio).

At issue is the Flood Insurance Administration's (FIA) recent contract award to Chicago Aerial Survey, Inc. to provide a free nationwide service to inform banks and insurance agents if properties slated for purchase must carry flood insurance.

Small business groups led by Cleveland businessman Bruce B. Felder and represented by Metzenbaum claim that local title insurance companies could perform the same search of properties in a given location as well as the federally funded operation could. The federally backed service is scheduled to be set up over the next three years.

A local service which would cost about $7 to the mortgage applicant and be included in the applicant's closing costs would be more feasible than a centrally located computer-based system, the group said.

The FIA has been criticized for its inability to quickly and accurately supply the insurance information needed to comply with government regulations that required insurance for flood-prone properties.

An Answer to Critics

The administration's answer was the Chicago-based operation which could cost between $6 million and $7 million annually, according to published reports.

Metzenbaum said it was a disappointment to see federal money spent when private enterprise could accomplish the task at no cost to the taxpayer.

For its part, the FIA argued that the Chicago system represents a way to reduce dependence on paper maps, since it relies instead on far more accurate computer files that will be set up to show which properties lie in flood-prone regions.

The FIA also wanted to speed the process of getting maps to callers requesting them. The agency has 120,000 map panels, each covering an area small enough to show various property boundaries, according to Deputy Federal Insurance Administrator Bob Hunter.

Further, the FIA found that many people requesting maps were not able to read them accurately, and this resulted in improper insurance risk assignments. These considerations prompted the organization to search for a way to offer "expert precision" to the lending institutions and real estate brokers seeking to determine who could or must get federal flood insurance.

If the computer data base contains no information on a certain property location, the matter will be referred to an expert map reader who will be able to determine where property lies in reference to the flood areas. After that, the information will become part of the system's data base, Hunter said.

A major part of the decision to go with Chicago Aerial was its claim that it could deliver requested information all over the country. It also pledged to "live within a 2% error rate in providing the service" and even bought a $10,000-deductible liability policy. "I'm sure they will be very careful," Hunter observed.

Not Accurate Enough?

But a spokesman for Metzenbaum said the data planned for use in the system may not be accurate enough to be useful because it (to his knowledge) is based on census tract lines, not property lines.

Further, rural areas are not well covered by the census maps, which provide more data on heavily populated areas. But "since floods don't discriminate between highly populated areas and rural areas," the central, computer-based operation might not have the information needed to complete the FIA's assignment, the spokesman asserted.

The local title insurance companies, by contrast, could obtain accurate information from local registries of deeds to determine where property lay in relation to the flood areas. If necessary, the property itself could be viewed if its location were in doubt.

The FIA has estimated that two million calls will be made each year to determine if properties should get flood insurance, but Felder has estimated the actual number of calls may run closer to six million. Even four million would translate to thousands of calls a day, according to the spokesman.

The additional calls may result in the system exceeding its annual operating budget, he added, noting that each call may take longer to complete if the available information is inadequate.

"Our opposition was based on the feeling that the FIA did not prove the need for the (computerized, centrally located operation) and that it would be able to hold to the projected costs of the system. And we didn't get any assurance from the FIA that funds would come from the FIA instead of Congress," he said.

"The contract seemed to be open-ended in the event the cost was higher than expected. Overall, we didn't think there was a compelling reason to go to the national system."

Canada Starting Project to Catch Workers Getting Unemployment

By A CW Staff Writer

OTTAWA — The Canadian government is setting up a computer-aided pilot program to catch employed workers who continue to collect unemployment insurance benefits.

Although the illegally gained benefits represent a fraction of the $4 billion the Canadian government pays out in unemployment benefits, they nevertheless "represent millions of dollars" and are the "most common form of abuse" of the unemployment insurance program, the Canada Employment and Immigration Commission indicated.

The commission is enlisting the aid of 200 corporations that use computers for payroll processing. If manual versions of the experiment — performed in mid-1978 — are any indication, the system should be able to show 86% of the overpayments the government makes after an unemployed worker returns to work and should do so within a few weeks of the return.

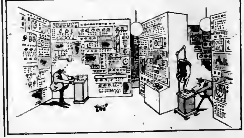
The pilot program matches data from employers' computer tapes to its own records using employee names, social insurance numbers and weekly salaries to make the match.

At present, employers are required to report to the government the date an employee started work only after that employee has left the company, a spokeswoman for the commission said. As a result, employees who return to work after collecting unemployment benefits often can continue to collect benefits for as long as 44 weeks before the government knows about it.

The new system, if successful, will benefit the government as well as employers and workers, according to the spokeswoman. The sooner the overpayments are detected, the less money will be paid and the less likely the government will have to prosecute to get it back, she said.

Employers benefit because they are less likely to have to go through the time, trouble and expense to extract payroll information needed to determine what pay period overlapped the unemployment insurance benefits, she pointed out.

And the employees are not able to get themselves into deep trouble because the payments should stop very shortly after they take new jobs, even if they don't report the changes, the spokeswoman said. This is particularly important because "many people do not understand what they are supposed to do," she added, "while others deliberately don't declare that they aren't working."



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Impact Report Sparks Ire Of Delegates to TDF '79

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — U.S. computer manufacturing and services companies are up in arms over a report recently submitted to the State Department on the impact of European privacy laws on American multinational corporations.

The report, prepared by New York consultants McCaffery, Seligman and Von Simson, Inc, (MSV), seriously understates the problems the new laws will cause, according to several participants at a recent conference here on transborder data flows. The critics termed the report "naive," "dangerous" and "inadequate."

Comprised of case studies of 11 multinational MSV client firms, the study was presented to the State Department shortly before the Dec. 3 TDF '79 conference. A number of DP equipment and services firms representatives at the conference claimed the report could undermine U.S. attempts to negotiate the amelioration of European privacy laws.

The State Department has for several years complained of a lack of hard information on the impact emerging data protection legislation in European and other foreign countries will have on U.S. multinationals. U.S. firms have agreed the scope of the problem has not been adequately documented, but insist the MVS report did not reflect the true enormity of the problem.

Further, they said the MSV report may lead to complacency on the part of the U.S. government in trying to combat what the firms see as a dangerous international trend toward data protectionism.

State Department officials, however, were quick to reassure critics of the report that the department is aware of the MSV report's shortcomings and does not consider its conclusions a definitive assessment of the likely impact of the national privacy laws.

The study has not been made public, but has been circulated throughout the government. It was undertaken to predict what effect statutory restrictions on the international flow of information could have on the 11 companies.

Type of User

MSV found the international operations of only two or three of the 11 firms would be seriously disturbed by restrictions on the transborder transmission of personal data. Critics of those findings note that the study did not cover banks, computer services organizations, credit card companies or other organizations with far-flung international computer-telecommunications networks.

As Alden Heintz, Tymshare, Inc. vice-president, noted at TDF '79, a chemical manufacturer may not be directly or adversely affected by the new European laws, but the same organization might be seriously damaged if its banks and DP service vendor are restricted in the transmission and processing of data gathered overseas for the manufacturer.

Another danger to which Heintz pointed is that the report might undermine U.S. efforts to negotiate guidelines for free information flow in the organization for Economic Cooperation and Development (OECD), currently the primary forum for developing an internationally satisfactory scheme for assuring the protection of personal information.

"The [report's] conclusions' naivete could be dangerous if put into the hands of the OECD," Heintz declared.

'Not Whole Story'

State Department science adviser Morris Crawford, however, sought to diffuse the controversy by saying the department feels the report, while "a very valuable contribution," is "not the whole story.

"I recognize the weaknesses that are evident in the MSV report, and I would like to see those weaknesses corrected," Crawford said after the conference.

"In my own opinion, the [MSV] case studies show very, very starkly that if there are interferences [through data protection laws] with corporate data that is integral to their planning systems — financial information, inventory, engineering data, sales data and the like — that it would be a very serious matter for the corporations."

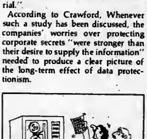
Crawford would like to see similar case studies of telecommunications, computer services, credit card and banking organizations. He said the uproar over the MSV study might prompt some of its critics to supply similar information about their own firms.

"I would hope they would give us comparable information that would give us greater detail," he said. "We've asked them to do this in the past. I don't think it's a secret that we are lacking in data . . . and that we realize that we lack data."

Unfortunately, he continued, the State Department has not been able to secure government funding to conduct a study on its own, and private corporations have been reluctant to supply the necessary data for fear of losing control over proprietary information.

A government study "would still have to have the approval of the companies because you can't conduct a case study like this without getting the data from the companies," he said. "You have to have access to the material."

According to Crawford, Whenever such a study has been discussed, the companies' worries over protecting corporate secrets "were stronger than their desire to supply the information" needed to produce a clear picture of the long-term effect of data protectionism.



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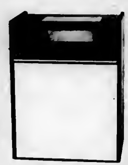

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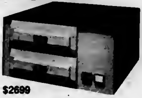

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Linowes Sees a Lot of Work Ahead

URBANA, Ill. — Because of the revolutionized nature of recordkeeping resulting from computer and telecommunications technologies, much remains to be done in all types of organizations to ensure the personal privacy of those about whom data is kept, according to Prof. David F. Linowes of the University of Illinois.

"There is a totally different concept to information as that known in the past," he said. "Computerized data is always alive, always retrievable and, furthermore, most of it is never destroyed."

While it was time-consuming, expensive and unrealistic in the past to try to retrieve one piece of information from hundreds of thousands of other pieces in manual system, today the obsolescence and uselessness of such information no longer holds, he said.

Furthermore, computerized information can follow a family "for generations," fostering an "atmosphere of intimidation," he maintained.

The very concept of American democracy which favors freedom of the individual can easily be eroded in a society in which a person is recognized for what he is or does, based on computerized records kept by various sources, Linowes said.

With data on hundreds of thousands of individuals being continually criss-crossed around the country "at the speed of light," it is very difficult to correct any errors in that data "without exerting a very positive effort," he noted.

By surveying 34 of the country's largest commercial banks on the extent of their privacy practices (see story on Page 19), Linowes hoped to increase the visibility of the need for privacy protection "before it's too late.

"We wanted to hold up a mirror" to the banking industry, especially since "many executives are not even aware of the consequences of privacy abuse," he said.

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Banks Found Disclosing Data Without Consent

By Marguerite Zientara
CW Staff

URBANA, Ill. — Three out of four large commercial banks routinely disclose information to credit grantors about their customers without those customers' permission, according to a recent nationwide survey.

That finding which relates to data that is for the most part computerized, was derived from a study conducted by the University of Illinois' Survey Research Laboratory for Prof. David F. Linowes, former chairman of the federal Privacy Protection Study Commission.

One hundred and thirty banks were sampled from the list of the "300 Largest Commercial Banks in the United States by State" as published in the Feb. 28, 1979 issue of the *American Banker*. Thirty-four banks, or 26%, responded to the 12-page questionnaire. These banks represent more than 13 million customers.

Of the 34 respondents, more than four out of five do not inform their customers of routine disclosures to nongovernmental inquiries, and three out of four do not inform them of routine disclosures to governmental inquirers, Linowes said.

Ninety-five percent of the banks surveyed, however, do limit the type of information they will release to nongovernment inquirers.

Customers' Records

Besides habitually withholding information on their disclosure practices, four out of five banks do not inform customers of the types of records maintained about them, the use to which these records are put or the records to which the customer has access, the survey found.

"This lack of communication between a bank and its customers discourages mutally trusting relationships so necessary in our credit-dominated society," Linowes observed.

And while 96% of the banks surveyed require a subpoena before they will disclose depository records to government agencies in accordance with the Financial Right to Privacy Act, 88% recognize administrative — easily obtainable "John Doe" - type — subpoenas in such a situation, Linowes stressed.

The average number of government requests received by a large commercial bank during 1978 was 483, the survey found. An average of 479 of those requests were granted.

On the positive side, nine out of 10 banks surveyed have designated an executive-level person to maintain privacy safeguards in their depository recordkeeping practices. While that fact indicates "the desire of banks to recognize the privacy problem," Linowes said, in the past two years "only little more than half have conducted a systematic evaluation of recordkeeping practices with particular attention to confidentiality safeguards."

Speculating that perhaps banks are not aware of the types of safeguards necessary in the face of computerized recordkeeping, Linowes guessed that possibly they "just need more time" or are waiting for legislation "to give them direction."

Such legislation may soon exist if a Carter Administration bill recently introduced in Congress becomes law. Now in legislative hearings, the Fair Financial Information Practices Act would give consumers the right to see and copy credit information, as well as the opportunity to correct it.

As for third-party collection of information about customers, the survey found four out of five banks verify or supplement background information collected directly from individuals, but less than half notify the customers before such data is collected about them.

Seven out of 10 do not give the subject access to the information collected.

"If this background information collected from third parties is in error, or is furnished by jealous or vindictive business associates or neighbors and meant to be misleading, the bank customer would never have an opportunity to correct it," Linowes noted.

"Thus, decisions would be made based on incorrect data, to the detriment of both the individual and the bank."

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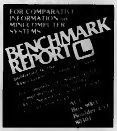

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BENCHMARK REPORT

EDITORIAL

'Best and Safest?'

The Federal Aviation Administration's (FAA) "best-in-the-world" automated air traffic control (ATC) system [CW, Dec. 10] is just not good enough.

In the face of repeated ATC computer outages, numerous recent DP-related near mid-air collisions [CW, Nov. 12, Dec. 3] and reportedly lax technical maintenance procedures [CW, Dec. 3], the FAA's "best and safest" claims are a legitimate cause for alarm for the country's 300 million annual air passengers.

In the first eight months of 1979, a total of 345 near mid-air collisions were reported to the FAA, compared with 286 reported in all of 1974. While most of these were not computer-related, of course, the statistic highlights the need for accurate and efficient ATC systems in skies that are becoming increasingly crowded with large capacity passenger jets.

Although the FAA has no plans to install the ATC computer back-up equipment in the country's Air Route Traffic Control Centers (ARTCC) or busy airport control towers as controllers have been requesting for years, the agency does have a back-up plan scheduled to be commissioned next February.

Called the Direct Access Radar Channel (Darc) system, the contingency plan was designed to provide controllers with limited data blocks, altitude readouts, weather data, maps and an improved display presentation over broadband radar, the present ATC back-up method.

Unfortunately, Darc is just one more example of the FAA's shortsightedness, especially in the area of DP requirements for air traffic control. Designed to alleviate system failures often related to memory overload, Darc will instead exacerbate the situation by taking up even more of the limited memory space in present ATC computers, according to John Galipault, president of the Aviation Safety Institute in Worthington, Ohio.

In addition, the FAA's plan to replace all ATC computer equipment by the mid- to late 1980s could well prove to be a case of "too little too late." Besides insisting that five to 10 years is too long to wait for such improvements affecting air safety, controllers and concerned observers fear that by the time replacement equipment is acquired and installed, it will be as obsolete then as the present equipment is now.

Furthermore, secondary to safety is the real and painfully relevant question of fuel consumption. When an ATC computer goes down, air traffic is often slowed because of safety considerations. Delays result, causing airplanes to use more fuel to land.

No one ever said the FAA has an easy job, but it will only get harder unless the agency acts immediately to prevent personal and economic disaster in our skies.

DATA PAST

Five Years Ago
Dec. 18, 1974

LOS ANGELES — This city's municipal computer system saved Los Angeles from picking up a $902,000 tab when its verification software rejected a fake check. The manager of the city's Data Services Bureau (DSB) and other city officials double-checked security measures in an attempt to find out who stole 17 of the blank treasury checks the DP center used for computer check printing.

— — —

LEXINGTON, Ky. — A model law to protect individuals from state government privacy violations was drafted and endorsed by the National Association for State Information Systems. The draft was considered at a conference on state and local implementation strategy for privacy legislation.

Eight Years Ago
Dec. 15, 1971

NEW YORK — A study conducted by the Diebold Research Program concluded that computer users within industries generally spent about the same percent of revenues on DP, whether they were large or small firms.

— — —

AKRON, Ohio — The Goodyear Tire and Rubber Co. patented a debugging system that "reversed nearly every approach normally used" in developing on-line programs and located bugs in a fraction of the time formerly required.

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LETTERS

Unfair to IBM's FE Division

"IBM User Warns of Move from Lease to Sale" [CW, Dec. 3] presented an unfair condemnation of IBM's Field Engineering (FE) Division.

Bob McKenna's perception of a decline in IBM service once he signed a purchase agreement for a 360/65 should not serve as a general indictment of IBM, as the article implied.

My company, a large insurance firm, has been operating purchased 370/158 and 370/168 systems in 25 regional locations since 1974. All of them are serviced by the manufacturer. We encountered no decline in service upon purchase of these systems. Since 1974, for business reasons, additional equipment from other vendors has been added, still with no overall decline in IBM service.

In our view, IBM service is subject to localized weaknesses from time to time, like any other service. It is a situation that must be managed, as with any other facet of the business. We have found the marketing representatives to be most helpful in improving services where necessary, since they have much at stake.

If McKenna made a switch to Sorbus, Inc. service as a business decision (to save money) that is well and good. However, to condemn IBM's FE Division because he encountered a local service problem is unfair.

Richard L. Marley

Bloomington, Ill.

Vocational DP Schools

The Nov. 19 editorial "A Crucial Commitment" accurately portrayed the problems generated by the divergence of the goals of research-oriented computer science departments of colleges and universities and the needs of the DP working environment.

The editorial suggested two solutions — the continued development of strictly DP programs in the academic sector as well as the concept of inhouse training of entry-level personnel. However, it failed to include a third option, one that has proven to be productive and viable — the technical, vocational DP institute.

Through intensive courses, taught by instructors with many years of actual experience in the DP field, these schools train students for entry-level positions and, at present, achieve placement of better than 90% of their graduates.

Although university and in-house training programs should continue to be developed, the proven success of graduates of data processing institutes in responsible positions in virtually all major corporations clearly establishes the development of these schools as a realistic approach to ensuring an adequate supply of trained professionals for the decade ahead.

George W. Capua

Woodbury, N.Y.

City Life for DPers

The commentary entitled "City Life Has Advantages for DPers" by Joe Rigo might be better named "Disconnected Ramblings on Random Happenings" [CW, Nov. 12]. The piece had little to do with either DP or city life, both of which are richer and more interesting than the sideshows that preoccupy Rigo.

What advantages does city life offer? An excellent job market. I don't know anyone who would sneer at that.

The city does attract large numbers of capable professionals. My own career has been enriched by contacts with many experienced and knowledgeable colleagues.

If you're ambitious, able and industrious, come to the city. Professionalism is alive and well here.

Eugene Cornell

Brooklyn, N.Y.

HUMAN CONNECTION/Jack Stone

Any Conference Managers in the House?

For years now, while in the audience of large DP conferences, I have allowed my mind to wander and have tried to remember if there was ever a time when the conference operation met what I would classify as first-class standards.

Perhaps your recollection is better than mine, but I certainly can't dredge up any quality productions from my mind. In fact, if my recent experience at one particularly prestigious gathering is any guide, conference planning is worse than ever.

Conference management is another one of those many communications functions DP managers should know about.

Nearly every DP manager throws or attends at least one major conference a year, and it surely is to one's credit if the show comes off in a professional manner. So, as another of my sometime series for DPers on "How to Simulate an Effective Manager in Real Time," I am devoting this column to a discussion of the topic "Nine Easy Ways to Tarnish the Professional Image at a National Conference," based on actual happenings at a recent conference. It is not intended that the ideas expressed are necessarily complete, but rather they should only be considered indicative of what one could accomplish if one really worked at it.

1. Invoke the spirit of medieval egalitarianism at the registration area by making sure that the revered speakers are "processed" right along with the milling masses. (As an occasional speaker at conferences, although my greatest thrill is wearing the usual green and white speaker's pennant that flows downward from my badge, I treasure a registration process design that employs a special desk for speakers and allows them to circumvent the mob scene.)

2. Increase the time attendees spend enqueued and raise their frustration levels to breaking points by allowing only one line to be formed to the registration desks. (One has to have the mentality of the unreconstructed American primitive to implement this strategy.)

3. After the attendees wend their respective ways down the registration line and arrive at the desk, tell them rather brusquely that the forms to be filled out are on the tables on the other side of the room and they are free to return to the end of the line after the forms are completed. (They didn't trap me in this merry-go-round — I noted the forms as I was searching for the speaker's registration desk.)

4. Build a high level of suspense in the audience by making sure the lights are down low or, preferably, off when the audience comes into the meeting room. Then make sure the light switches are not accessible so that the lights can't be turned on and the speaker gives his talk in the dark. Later, when somebody figures out where the switches are, be certain they don't work.

5. Try to have the moderator lose the sheet of paper containing the background of one of the speakers. To recover, the moderator can have the speaker give his or her own introduction or ignore the matter altogether.

6. Instruct the speakers to project af least one slide/foil of some actual, detailed documentation to establish credibility of the research and then announce that the material is too detailed to be seen.

7. Save precious resources and don't plan to have anyone around to change foils. Also don't plant a mike at the foil projector. In this way, the speaker can run to the end of the stage, down the steps, over to the projector, switch foils and run back to continue the speech, losing calories while announcing some momentous breakthrough in something or other.

8. Provide an attractive "come-on" to the vendor displays in the form of two free chits for cocktails, each worth $1.50, and then charge $3 to get in the door.

9. Under no conditions allow questions from the audience to be repeated by the moderator. In this way, the questioner and the speaker combine furces in a private colloquy and ignore the rest of the listeners, a final action which leads to a basic question, "Was this conference really necessary?"

READER COMMENTARY/Stanford L. Vogel

Halon May Not Be Best Protection

The Oct. 22 editorial entitled "Disaster Planning" suggested that the installation of Halon would constitute an unqualified upgrade from the use of water sprinklers for fire protection. It implied that the only reason not to install Halon is its high cost.

Allow me to introduce you to a National Aeronautics and Space Administration (Nasa) policy document called "Protection of Essential Electronic Equipment Operations." It is dated January 1979 and contains the following policy statement for Nasa:

"1. The use of Halon 1301 (bromotrifluormethane) total flooding type fire extinguishing systems is prohibited in essential electronic equipment operations...

"2. Wet-pipe, centrally supervised, automatic sprinkler systems utilizing approved on-off type recessed sprinkler heads shall be the standard fire extinguishing system for electronic equipment operations."

The policy statement (NSS/FS1740.3) was issued by Reuben P. Prichard, Nasa's acting director, Safety and Environmental Health Division Office of the Chief Engineer. A background study of the Halon/water discussion was issued by Nasa on Nov. 9, 1978. It supports the policy statement of January 1979.

Following are excerpts from the report's discussion of problems encountered with Halon:

"There are a myriad of problems with Halon 1301, both theoretical and operational.

"The ability of Halon 1301 to extinguish and prevent reignition in a Class A fire is poor. For an extinguishing agent to be effective, it should control and/or extinguish fires which are beyond the control of hand extinguishers. Generally, an effective agent should have a substantial cooling effect, so that the fire does not rekindle when the agent dissipates.

"While control of fire with Halon may occur, sufficiently higher temperatures to cause damage (120°F over) may continue for some time although flaming ignition is not present. Further, success or failure of the agent should not be totally dependent upon every factor having to work perfectly. If a door is left open or a damper fails to close, Halon will dissipate — and the system may fail. . . .

"The current standard for Halon system installation, NFPA 12A Halogenated Fire Extinguishing Agent Systems — Halun 1301, limits the concentration of the agent to 7% in air. A higher concentration would be more effective in extinguishment but the inherent toxicity of the compound precludes a higher permissible concentration. . . .

"Human subjects exposed to Halon 1301 have shown both an increase and decrease in blood pressure and heart rate. The data supplied by three separate human studies indicates that concentrations of Halon 1301 exceeding 10% may produce definite cardiac and central nervous system effects and that concentrations of the order of 15% to 20% may lead to unconsciousness and cunceivably death . . . . Prichard summarized his findings as follows:

"In summary, Halon 1301 for computer room operations:

- May allow heat damage to continue even though flaming ignition is curtailed.
- Is suspect in its ability to extinguish a Class A fire.
- Involves high capital and operating system costs.
- Involves high agent costs (initial and replacement) and agent supply is limited.
- Presents potential toxicological problems.
- Presents physiological hazards.
- Requires significant maintenance.
- Has poor flexibility for room configuration changes.
- Is complex and poses reliability problems.
- Is subject to unnecessary discharge.

"Conversely, the wet-pipe automatic sprinkler system using recessed on-off sprinkler heads:

- Is economical to install and maintain and agent supply is unlimited.
- Utilizes the most effective extinguishing agent known — water.
- Limits water distribution (amount and area).
- Requires minimum maintenance.
- Is nontoxic.
- Is flexible with change in configuration.
- Has proven effectiveness over long time periods."

An Oversimplification

While water sprinklers are not a perfect solution to the problem of fire extinguishment and it is not my intention to fan the flames uf the Halon/water debate, it should be recognized that Halon technology may not have reached the point where it represents an unqualified improvement over water sprinklers.

It would seem that *Computerworld*'s editorial response to the U.S. Census Bureau's disaster was an oversimplification that could mislead new computer users.

Vogel is a specialist in information processing security with General Electric Credit Corp. in Stamford, Conn.

READER COMMENTARY/Pacifico A. Lim

In Search of Better Code

Since my article "Users Shouldn't Avoid All Cobol GOTOs" [CW, Oct. 1], I have read two comments about it. Nick Galemmo mentioned that his organization has been using a similar technique and has been successful in improving programmer productivity and significantly reducing maintenance effort [CW, Oct. 29].

He did mention several things he felt were required to promote a good top-down program structure. First, he suggested the use of prefixes for section and paragraph names. Actually, I am familiar with their use but did not mention it because it was irrelevant to the discussion.

Second, he proposed an exit for all paragraphs. This is really a matter of choice and there is nothing wrong with it. My view is to code it if it is required; otherwise, leave it out. The paragraph will actually look better because it will not be cluttered with an exit paragraph.

Third, he suggested that sections should not be performed. Actually, sections are already being performed (albeit indirectly) in the case of the input or output procedures of the SORT statement. In fact, the best way to modularize the procedure division is to divide the program into one or more sections that are performed one after the other.

Fourth, he suggested the avoidance of the priming read (although he admitted this to be a matter of personal preference). The idea of priming is actually easy to under-

(Continued on Page 22)

GOTO-less Code Not an Improvement

(Continued from Page 21)

stand and also comes up in the use of indexes or subscripts. For instance, if we want to zero out an array of counters:

```
SET ZERO-I TO 1.
PERFORM ZERO-ALL-COUNTERS
  UNTIL ZERO-I GREATER THAN
    ARRAY-CNT
.....
ZERO-ALL-COUNTERS.
  MOVE ZEROES TO ZERO-CTR (ZERO-I).
  SET ZERO-I UP BY 1.
```

Note that the index is primed to the proper value (in this case 1) and then the ZERO-ALL-COUNTERS paragraph is performed. The last statement of the paragraph sets the index to the next value so we get the correct element of the array on the next execution of the paragraph.

Let's compare this with the concept of the priming read.

```
PERFORM READ-TRANS.
PERFORM PROCESS-RTN UNTIL TRANS-
  KEY EQUAL HIGH-VALUES.
.....
.....
PROCESS--RTN.
  PROCESS THE TRANSACTION.
  PERFORM READ-TRANS.
```

Note that we read the file so we get the first record and then the PROCESS--RTN paragraph is performed. The last statement of the paragraph gets the next record for the next execution of the paragraph.

Both styles are similar.

On the other hand, Bruce Sherman advocated the total avoidance of GOTOs [CW, Nov. 5] and proceeded to give GOTO-less implementation of my original examples. However, his examples show that the avoidance of GOTOs at all costs can sometimes result in inferior code.

His implementation of Figure 3 violates ANS Cobol specifications. My article specified this to be an input procedure of the SORT statement, which must be coded as one or more contiguous sections. Thus it must have a section header.

His example of using a paragraph in place of sections works only for IBM compilers because of an extension (as yet undocumented). I have verified that this does not work for Burroughs Corp., Honeywell, Inc. and NCR Corp. ANS Cobol compilers. In fact, the very fact that it is undocumented convinces me this was not done by IBM on purpose, but just happened to work.

This is not the way to teach Cobol. We should not teach a technique that only works because of an undocumented extension of a single manufacturer. Instead, why not use the correct language specification so that the code will work in all compilers? This makes the program more portable.

The rule I mentioned regarding the use of GOTO for a performed section is really very simple. First, use the GOTO as the last statement of the first paragraph of the section. Second, the object of this GOTO is the exit of the section, which is the exit paragraph just before the next section header or is the end of the source deck. What's so hard about this rule?

In Figure 4, he suggested breaking up the original paragraph into two paragraphs, with the first controlling the second through a PERFORM and then commented that the resulting code is easier to modify during subsequent maintenance. But what is so hard about the original paragraph? What could possibly happen? Suppose a new record type is added to the file and we have to bypass it also? In both examples, there will be no changes.

In Figure 5, he mentioned that in spite of the fact that there is only one GOTO in the paragraph, it is much more difficult to understand. But what is hard to understand about a paragraph that tests a condition and continues or bypasses processing based on that condition?

Sherman's implementation of Figure 6 is a total disaster. Or, maybe, he just misread the article. The original paragraph is supposed to validate the fields and lay out the corresponding error messages. Instead, he used a single paragraph to validate all 20 fields mentioned in my article (he even said he can use it for 2,000 fields). This is just impossible.

First, not all fields will have the same USAGE and length. Thus you cannot usually define all of them with the OCCURS clause; maybe a few, but not all. Second, fields do not have the same validation requirements.

Figure 7 can be done either way. The use of the depending-on option of GOTO may indeed be used to implement the case construct. As long as the programmer understands the syntax requirements of TRANS-CODE, he should have no problem.

Lim is a project leader for Merchandise Statistics Systems at Lord & Taylor, New York.

Small Business Systems Surveyed

Microdata Reality Gets Top User Rating

Microdata Corp.'s Reality, Basic/Four Corp.'s Model 400 and the IBM System/3 models 6, 10 and 15 reaped the highest marks in Management Information Corp.'s (MIC) fourth annual small business systems users survey.

To assess how well small business systems are meeting users' needs, MIC polled 568 companies that use 689 small business CPU's.

Each respondent was asked to subjectively rate the vendors and their products on performance (whether stated equipment specifications have been realized), reliability (uptime vs. downtime), ease of use (amount of time necessary to train new personnel), service (maintenance) and vendor support (such as advance training and program assistance).

A four-point rating scheme was used (1 = poor, 2 = fair, 3 = good, 4 = excellent). The survey results were given as averages of the ratings assigned to each product in each of the five categories.

The Microdata Reality, Basic/Four 400 and System/3 Model 10 and Model 15 were the only small business systems to receive ratings of 3.0 or higher in all five categories.

Taking the average of all five categories, the Microdata Reality topped the field with a score of 3.66 (based on 27 respondents using 55 units). The Reality earned 3.8 in performance, 3.8 in reliability, 4.0 in ease of use, 3.4 in service and 3.3 in support.

Based on nine respondents with nine units, the average for the IBM System/3 Model 15 was 3.6. This system was rated 3.6, 3.8, 3.6, 3.7 and 3.3 in performance, reliability, ease of use, service and support, respectively.

Eight users with 17 Basic/Four 400's gave that system an overall rating of 3.5. In performance, reliability, ease of use, service and support, the system was rated 3.5, 3.4, 3.8, 3.4 and 3.4.

Following this order, the IBM System/3 Model 10 was rated 3.3, 3.5, 3.3, 3.3, and 3.3, respectively, by 34 users with 45 units. The System/3 Model 6 received 3.4, 3.7, 3.7 and 3.1 ratings in performance, reliability, service and support, respectively, by eight users with eight units.

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THE TAYLOR REPORT/Alan Taylor

Question of Morals Arises in Delivery Delay

The situation with regard to the delivery failures of Honeywell, Inc.'s Level 6 systems (discussed here last week) involves the more general questions of ethics and morality in the industry.

The company has claimed it is both highly ethical and highly moral. It maintains that it is unnecessary for the corporation itself, or its computer subsidiary, to keep customers directly informed about whether corporation promises might be broken or how badly the corporation might let them down. According to Honeywell, the salesmen tell customers the details as soon as they realize the danger of possible broken promises.

Well, I would not rely on this sort of information system. The salesman can only find out about the problem after the company does, and by delaying and covering his knowledge, he can use the system as a lock-in. But beyond this is the whole question of corporate morality in using salespeople this way.

This is not a question of ethics. Honeywell, for all I know, may well be highly ethical. Ethics, however, can be good or bad — they are simply a matter of rules being stringently observed. The adjectives that most properly describe ethics would be "strong" or "weak," depending upon the discipline supporting the observance of the rules.

Morals are different. To judge the Honeywell situation in this respect, we have to look at the three situations when delivery promises are liable to be broken — rash promises, impossible promises and forced failures.

Rash Promises

The first case is where the company has made a promise without certainty that it will be able to live up to it. This seems to be the situation with Honeywell's Level 6 deliveries. Although integrated circuits have been in short supply for some time, it appears that Honeywell did not contract for the number it needed to make all the promised deliveries in October, November and December.

Honeywell and I agree that the customer needs to know as soon as possible if promises are liable to be broken; the question is whether the corporation or the salesman is to handle the matter. The salesman's knowledge is necessarily incomplete, and he knows it. It is also second-hand and, therefore, delayed. Both the promptness and completeness of the information could be ensured if the corporation were to write directly to the customer. However, Honeywell is content to use an indirect and delaying path to give endangered customers knowledge that, by Honeywell's admission, they have a right to receive.

That is not a moral behavior, even if it conforms to corporation ethics.

The second situation is the impossible promise. Here, at the time the corporation accepts the contracts, it knows it may not be able to make the promised delivery. (This is not normally a contract term, so the question of legality is not directly involved.) Effectively, the corporation is telling a lie and stands to profit from it.

The final situation involves some forced failure. The corporation makes the promise on good faith, has adequate supplies ordered or in hand and then a flood or fire makes delivery impossible. This could take place in a supplier's plant, making the aupplier break his contracted delivery date, as well as with the vendor itself.

Here again, the customer should be given prompt official notification.

(Honeywell has told me that no supplier failure is involved in the Level 6 delays.)

Industry Standard Defense

Honeywell's alternative defense is that standards within the computer industry permit both breaking delivery promises and delaying information about the known likelihood of such failures until a salesman decides to tell a customer.

Industry standards may well be as bad as Honeywell implies — and in fact I think they are. What is important here, from a customer's point of view, is to realize that Honeywell and many other firms in the computer business are simply not morally reliable when it comes to deliveries. Even lines like the Level 6, which has been in production for years, can be suddenly delayed for months by parts shortages. The one thing a customer can do is prepare some contingency plans. In general, Honeywell and other manufacturers will respond to firm demands for some alternative source of computing power — if it is needed and will do the job. So users should look for a way some other equipment from the same vendor could temporarily tide them over and should make preparations during the predelivery phase that are transferable to the alternative system if delivery does fail.

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Users Group Funds Project

Students Enhance HP Users' Library

By Don Leavitt
CW Staff

WALLA WALLA, Wash. — A recent conversation with Wayne E. Holt, the DP director at Whitman College here, showed clearly that some user groups succeed because they recognize their shortcomings and then do something about them.

In addition to his duties with the college, Holt chairs the Program Library Committee of the Hewlett-Packard General Systems Users Group. For years, materials for the library — contributed by group members from around the world— were handled by the Whitman data center, but none of the center's regular staff had time enough to really get them organized.

Holt proposed that the group sponsor a summer work project, hiring students from various colleges that had HP equipment to work full-time at Whitman on the library. The group's board of directors accepted the proposal; as a result, students from several colleges gained good experience, and members of the users group gained a far better library than they had before.

Holt wasn't aware of any project similar to this one that had ever been funded by a users group. The five students hired for the project, selected from three colleges in addition to Whitman, worked "late nights and weekends" to reorganize the library, write current and understandable descriptions and generally clean up much of the material in the library files, Holt reported.

"It was a 'learn-as-you-earn' project," he said. "Our previous attempts to clean up the library materials were good, but did not really result in a finished product."

Project leader Mark Wysoski (left) reviews output with Whitman student Jeff Barrett.

By contrast, Release 06 of the library, distributed on magnetic tape starting in October, is "the first truly well-documented, readily usable directory" the group has had.

Even though last summer's project accomplished a lot, it will take two more releases of the library tape before Holt is completely satisfied with what the group is offering its members. Since two releases are issued each year, that means another year of work — generally on a part-time basis during the regular school year but, if all goes well, with another group-funded student project next summer.

The remaining work includes both maintenance of what has been done — as corrections and revisions are received and the capabilities are better understood — and documentatiun of new materials, which are arriving "almost daily," according to Holt.

In one week recently, for example, the library received a program from France, a statistical programming package from Finland and an econometrics program from the London School of Economics.

Holt is certain students will be used again next summer and said several of this summer's workers have indicated they want to be included. Students who took part in the 1979 summer project were Mark Wysoski from the University of Pennsylvania; Leslie Dauterman of Illinois' Principia College; Jim Herod, University

(Continued on Page 26)

On-Line Programs Simplified

TORONTO — Described as "an on-line application for developing on-line applications" in IBM 370 or compatible environments, Act/1 automates a majority of the time-consuming, labor-intensive activities normally required in that process, according to the package's vendor, Application Development Methodologies Ltd. (ADM).

Act/1 enables the user working with OS/SVS or MVS to interactively design and implement CRT screen displays and all the coding needed to handle responses to the screen even before any conventional code has been written by the development team, an ADM spokesman said.

Because it allows and encourages early screen design, Act/1 lets the analyst simulate program logic and then work the end user to verify and, if needed, modify his understanding of the user's requirements.

Based on the user's reaction to the simulation, the analyst can decide to change the overall approach to the problem or to implement the changes which have been identified and proceed with more feasibility and design work.

Under Act/1, the transition from analysis to design is made in stages and the simulations are expanded to include all application functions. In addition, the programmer can attach "notes" to the screen designs, and these become documentation for actual program development, the spokesman said.

As the design process reaches completion, Act/1 is used to create a "live" demonstration of the applicatiun which the users themselves can operate. This sets up another point at which user needs can be checked; it also helps the user learn how to use the application.

Act/1 was designed to operate with Vsam and IBM 3270-compatible CRT terminals. It interfaces with the Time Sharing Option (TSO) and CICS under MVS as well as with CICS under

(Continued on Page 26)

DG CS Users Offered Program Aid

HOUSTON — The Datacoder package from The Data Companies is an application system generator that is fully on-line and operates interactively, currently on Data General Corp. CS series minicomputers.

Supporting multiterminal operations, the software is coupled with a data base that allows the user to define system and informational needs and then produce the program code and start running it, a spokesman explained.

Datacoder, furthermore, is a complete programming tool: it will create and print documentation — including program narratives, "where used" reports, data descriptions, validation criteria and calculation criteria — from the data base, the spokesman continued.

The vendor's description of the product suggests impressive capabilities, but provides very little detail. The writeup states, however, that a "typical report program" of 1,600 source lines can take as few as 20 minutes to specify and 30 minutes to catalog, generate and compile when installed on CS series machines. Cataloging, generation and compilation of the same program on an IBM 370 has been completed in less than 60 seconds, the company claimed.

Implementations beyond the DG CS environment are set for release in the near future, the spokesman said. The current package costs $15,000, but the company expects clients to attend a week of classes here for an additional $2,500, to learn how to use the software.

The Data Companies are at Suite 500S, 11777 Katy Freeway, Houston, Texas 77079.

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'CDPS' Puts DBMS, Other Support on Series/1

ATLANTA – The Champion Distributed Processing System (CDPS), an Installed User Program being marketed by IBM's General Systems Division, was designed to aid in the implementation of applications on the Series/1 minicomputer.

When there is a requirement for multiple Series/1s to perform local processing at different locations, CDPS aids in the central development of remote application program and communications between these systems and a host system, a spokesman explained.

The major components of CDPS are said to be a self-contained operating system; a data base management system (DBMS); CRT station suppport and a CRT screen design facility; printer support; a unique programming language; a source entry utility, on-line compiler and interpreter; utilities including a disk sort; and support for job control, including stored procedures.

Services provided by the supervisor include support for multiprogramming and multitasking, management of as much as 128K bytes of main storage, operator interface commands and automatic program relocation. Program execution by priority, error logging and error recovery and support for both asynchronous and binary synchronous communications are also featured, the spokesman said.

The heart of CDPS – developed by Tominy, Inc. of Cincinnati for Champion International – is the DBMS, which provides multiple functions for the utilization of direct access storage devices.

As with all Installed User Programs, CDPS is available from IBM on an "as is" basis, with no centralized support for maintenance or enhancement.

CDPS requires a minimum 64K-byte Series/1 with an IBM 4964 diskette storage drive, 4962 storage drives, 4979 CRT station and a 4973 or 4974 printer. Cataloged by IBM as Item No. 5796-NRD, CDPS costs $170/mo, but monthly license charges are suspended after 12 payments.

Group Gets Better Library

(Continued from Page 25)

of Nevada; and Heff Barrett and Mel Ross, Whitman College.

To illustrate how independent of Whitman the project was, Holt noted Wysoski was the student project leader.

More than 20 students have participated in the library reorganization project in the past few years, many as volunteers anxious to get experience to supplement classroom lessons. Because of projects like this and other work at the Whitman data center, the college's students "are in great demand for computer jobs," Holt said.

Holt became chairman of the user group library committee in 1977, when there were about 500 members. Now there are more than 2,000 members and the software in the library is worth "in excess of $1.5 million."

It's reached the point that "people put their best software in the library because they're proud of their work" and they want to share it with others.

Using the college's own experience as an illustration, Holt said there are various advantages in belonging to the group: "At Whitman we have used 20 or 30 items from the library in the last two years. They are available to us free because we're in the group. Some of these items would have cost us several thousand dollars to produce."

Holt is looking forward to continuing the improvement of the library by actively going into current programs and enhancing them, by soliciting software from people who would not ordinarily contribute it and by expanding the directory of HP software which is not in the library.

'Act/1' Eases On-Line Coding

(Continued from Page 25)

DOS/VS and is compatible with any standard data base management system, the spokesman claimed.

Supporting the development and execution of Cobol, PL/I or assembler programs, the complete Act/1 package costs $32,200 for MVS/CICS, $34,200 for MVS/TSO or $40,000 for both facilities under MVS. The DOS/VS version, ready next month, will cost $16,100.

The design aid portion of the package – including support for the user-accessible simulation – is available now for $1,995 for either CICS (DOS or MVS) or TSO or $2,992.50 for both, as a special introductory offer, the company reported from the Fourth Floor, 250 Consumers Road, Willowdale, Ont., Canada M2J 4V6.

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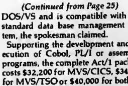

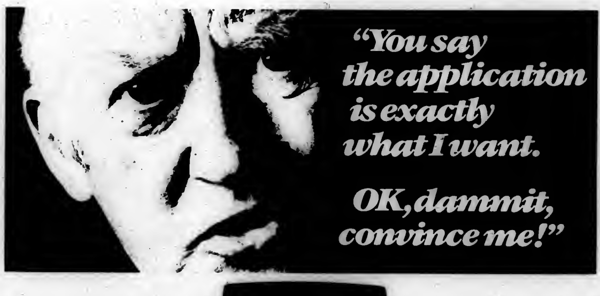

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Package Cross-References JCL in DOS, DOS/VS Sites

SANTA CLARA, Calif. — Job control statements for IBM DOS and DOS/VS sites can be listed, summarized and cross-referenced from systems or private source statement libraries or from the DOS/VS procedure library by Procxref, according to a spokesman for Software Assistance, its vendor.

Procxref produces a detail listing of all procedures selected and a number of cross-reference reports for the different types of JCL statements contained in those procedures. The detail list shows the entire contents of all procedures selected in a two-up format that puts multiple procedures on a page, the spokesman said.

Cross-references are created for phase-names, file names and file identifications from both TLBL and DLBL statements and from EXTENT information. Each report is user-selectable, so a site gets only the information it requests and is not swamped by what it considers excess reports.

The program is directed by control cards or UPSI settings and can be initiated from either SYSIN or SYSLOG. Runtime options include the ability to name the source of the input statements, the procedures to be selected or rejected — global selection or rejection of any or all procedures may be specified — and the types of reports and cross-references desired, the vendor noted.

The spokesman also said a sort program is loaded and used internally (via standard exits) to resequence the information to be cross-referenced. Certain control information may be passed directly to the sort to simplify its use.

Procxref is distributed on magnetic tape for $1,000; discounts are available for multiple-site installations. Software Assistance can be reached at P.O. Box 2101, Santa Clara, Calif. 95051.

'Keyfile' Runs on PDP-11

NASHUA, N.H. — A data base management system to handle text and graphics files on Digital Equipment Corp. PDP-11s, Keyfile from Nashua Digital Sciences, Inc. can handle records and files of any length as well as mixed data types.

The package was designed to support the development of word processing, document production and office automation systems. The ability to handle mixed data types — Ascii, Ebcdic and binary — makes Keyfile particularly suitable for computer-aided design systems and large, sensor-based, data gathering applications, a spokesman said.

As a general-purpose data base manager, Keyfile supports network structures as well as graphs and complex organizations. Any data element in the base can be associated with any other element and with multiple elements in both directions, the spokesman noted.

The Keyfile control system provides data base access and manipulation.

Keyfile presently operates on DEC's PDP-11 line under RSTS/E Version 6C or later, with a minimum of 96K words of main memory. Future releases are expected to support the RSX-11M and VAX/-VMS environments.

The package costs $12,000. On-site installation and training is available for $3,000 plus expenses, the vendor said from 2 Wellman Ave., Nashua, N.H. 03060.

CP/M Available For PCC 2000s

CHATSWORTH, Calif. — Already in use on many other microcomputers, CP/M, the operating system from Digital Research, Inc. is now available to users of the Pertec Computer Corp. (PCC) 2000 desktop system.

Basic facilities of CP/M include dynamic file management, an assembler, a text editor, a debugger and several utilities. Basic-80, Fortran-80 and Cobol-80, all developed by Microsoft, Inc., can be implemented under CP/M.

CP/M for the PCC 2000 is available through more than 100 authorized dealers in the U.S. and Canada and a network of international dealers and distributors. Its cost varies from dealer to dealer, a spokesman said from PCC's Computer Systems Division, 20630 Nordhoff St., Chatsworth, Calif. 91311.

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User Blends Software Mix Into DB/DC System

By James R. Egenrieder

Special to CW

We at AMP, Inc. have combined IBM's CICS/VS, Cincom Systems, Inc.'s Total data base management system, OS checkpoint restart facilities and advanced recovery/restart techniques to form a most interesting and capable data base/data communications (DB/DC) system.

The system, named CAT/R2, includes CICS/VS Release 1.3, Total Release 8.0 and an AMP-developed recovery/restart component. It operates on an IBM 3032 mainframe under OS/VS1 and Vtam supporting 200 local and remote CRT and printer devices.

Total executes in a central partition mode servicing both the CICS partition and one or more batch partitions. Total data base files are updated concurrently by the batch and on-line partitions.

Since AMP's seventy-file data base is integrated with most of its batch and on-line application systems, concurrent batch and on-line update was a key objective of the CAT/R2 system.

The most important aspect of the entire CAT/R2 system is that it uses only standard facilities of CICS, Total, and OS and was designed to be release-independent. Most of the AMP-developed software for the recovery/-restart component is placed in standard exits in the CICS dynamic backout module and Total's interfaces for CICS and batch programs.

In addition, there are several programs used in the emergency recovery procedure and several macros used in CICS application programs.

Recovery/Restart

The recovery/restart component provides all of the facilities needed to have multiple tasks updating the data base concurrently. These facilities include:

- Task-level checkpointing to allow a task to commit the updates it has performed against the data base and to CICS-controlled resources since its prior checkpoint. The checkpoints can be initiated directly by the application programs or indirectly by the CAT/R2 system using externally controlled parameters.
- Reverse transaction logging to track the updates performed by each task.
- Dynamic task backout to reverse the updates performed by a failing task.
- Checkpoint synchronization to allow task — level data base checkpoints to be synchronized with CICS syncpoints or OS checkpoints.
- Task-level record protection to reserve the records updated by a task for the duration of that task.
- Record contention analysis to automatically recognize contention at the record level between two tasks and to force the intruding task to abend and be backed out.
- Automatic task restart following a record contention abend for both CICS and batch tasks.
- Emergency recovery facilities to recover the data base to the point of failure and back out in-flight tasks following a system-level failure.
- Emergency restart facilities to automatically restore screens and restart CICS tasks, assuming certain security provisions are met, following a system-level failure.

System Nucleus

The nucleus of the system is a relatively simple record-holding technique that features a task control element stored in each data base record used in conjunction with an active task table. Using this technique, the system need only analyze the records that are directly involved with the requested data base function. It does not need to analyze or protect the multiple access paths to the record, thus simplifying the entire problem.

Both the active task table and the dynamic log file used for reverse transaction logging are Total data base files maintained by CAT/R2 using standard Total facilities.

Challenge Met

Since its implementation last February, the recovery/restart component has successfully met the challenge of several system crashes and many task-level failures.

Performance has been most satisfying. In a typical day, 120,000 on-line transactions and 100,000 batch transactions are processed with a response time (measured internally) averaging 1.5 sec for on-line and .1 sec for batch. The transactions range from simple master file inquiries to complex bill-of-material and customer order maintenance.

The system has proven to be quite capable of handling AMP's requirements for the present and immediate future.

Egenrieder is project manager of data administration for AMP, Inc., a manufacturer of electrical and electronic connection devices headquartered in Harrisburg, Pa.

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FOREST PARK, Ill. — United Stationers Supply Co. is an independent wholesaler of stationery products with about 25,000 cataloged items in its master file. It maintains an inventory of 20,000 products which it sells to 6,000 customers around the country.

Although it is headquartered in Maywood, Ill., United Stationers has its central DP department here, with 25 people in programming and operations and a pair of IBM 370/158s. The operation runs smoothly, thanks in part to packaged software.

The company has had Datacom/DB and Datacom/DC — the data base and data communications packages from Applied Data Research, Inc. (ADR) — "for a number of years," according to Alfred Maioriello, director of management information services (MIS). "Initially we had only 16 terminals and were just doing on-line order entry.

"Since then, we developed most of our functions on-line, including receiving, accounts payable and accounts receivable, billing, inventory control, file maintenance and file inquiries. In the future, we're thinking about making automated buying available on our CRTs also."

The system now supports more than 150 terminals in five locations, and Maioriello said his crew couldn't have done the work without the Datacom software. "When we went to Datacom/DB with its multiuser facility, we were able to use multiple keys and access the same data with different keys. This allowed concurrent processing from multiple partitions and made it easier to design files, easier to keep up with user demands and special requests."

Throughput and efficiency rose dramatically with the software: "We used to have a response time of 5- to 8 seconds, but Datacom cut that just about in half. Now response time throughout the network is virtually instantaneous, and we're handling about 150,000 transactions a day.

That has eased the company's contacts with its customers. "We're in a conversational mode with our accounts. They call in orders and our people use CRTs to give accurate answers when asked if particular items are in or out of stock," Maioriello explained.

"It's very critical that we don't keep an account on the phone too long. That's where Datacom/DB and DC come in. They have made vital contributions to the efficiency of our operations and the success of our company."

United Stationers' DP director, Alfred Maioriello, checks to see how things are going with clerk using light pen to modify CRT display.

While the use of the software has helped United Stationers' customers, the simplicity of coding under Datacom/DB and DC has "definitely helped our programming staff," the manager continued. "We have been able to take trainees right out of school and make them effective programmers within six months."

Vendor Support

Vendor support also received a nod of approval from Maioriello. Though he's had very little trouble, "naturally there are always some problems because no one is going to put out a perfect software package. But the problems we encounter are taken care of promptly.

"If it's urgent, we can talk to someone from ADR on the phone, and usually that corrects the problem right then and there. Telephone communications are important to us because we're in Chicago and ADR's Datacom support is in Dallas. Fortunately, ADR has recognized how important prompt service is and it's improving it all the time."

Other products directly related to Datacom/DB and DC are beginning to move into United Stationers' data center. The Datadictionary package is there, though Maioriello hasn't put it on active use as yet. He said the center has its own documentation methods for in-house jobs.

The dictionary looks good, he said, but he wants to be sure he knows how he wants to implement it before it gets the go-ahead.

Maioriello said the company also has the latest release of the Datareporter package and is doing some beta testing for the new updates. "If the testing goes as well as we anticipate, this product should fit into our environment very well. It interfaces with Datacom/DB and should enable us to handle user inquiries much faster."

On the other end of the time scale, he recalled that United Stationers has had ADR's The Librarian source program library system for a long time "and it's really done an excellent job for us."

MCBA Package Adds To Use of TI 990s

LOS ANGELES — Mini-Computer Business Applications, Inc. (MCBA) has extended the software coverage it offers users of the Texas Instruments, Inc. 990 microcomputer. MCBA has announced the availability of an order entry and invoicing package that includes inventory control.

Written in ANS Cobol 74, the package joins an accounts receivable system and a mailing list routine already available from MCBA for TI users. An accounts payable system, in TI Cobol, is expected to be ready for release later this month.

The order entry and invoicing software costs $1,500 from MCBA at 117 S. Brand Blvd., Glendale, Calif., 91204

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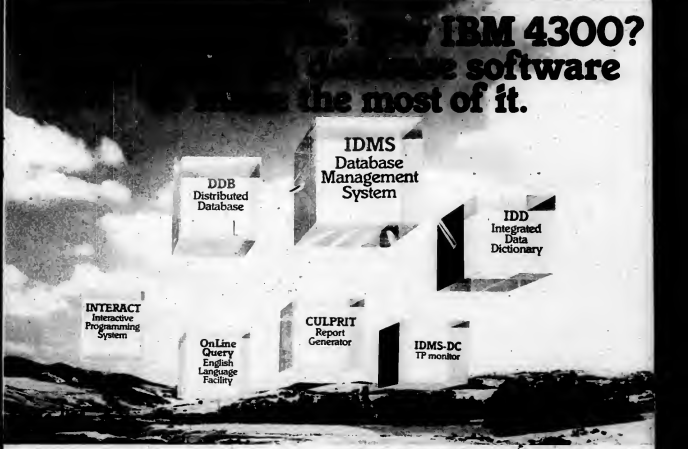

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IDD is the only "active" data dictionary because it is fully integrated with a database system. It is a powerful design and control tool for use with IDMS and with the other Cullinane software components, yet it can be used as a stand-alone system to define and standardize *all* data resources whether manual or automated, database or conventional file systems. IDD supports FORTRAN, COBOL, PL/1 and Assembler.

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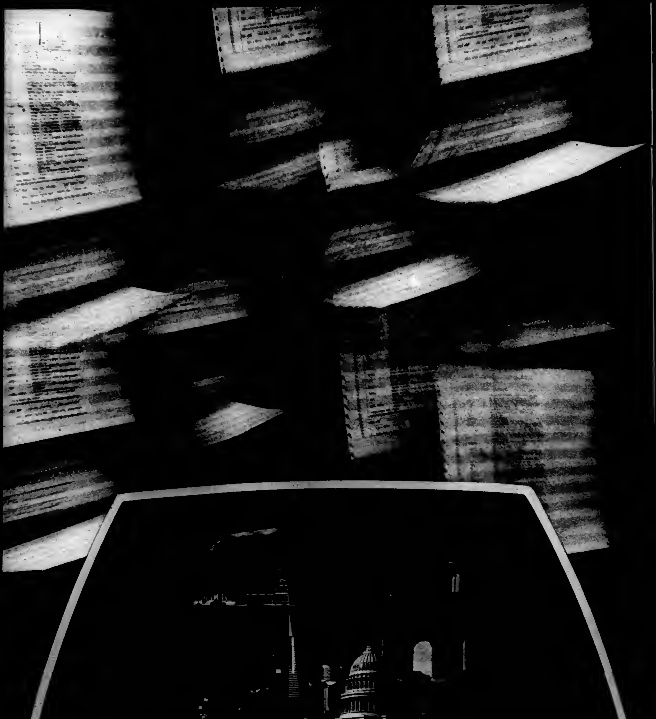

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DP Dialogue

Notes and observations from IBM
that may prove of interest to
data processing professionals

Getting More Gas from Coal with Less Energy

The energy crisis has prompted new interest in coal gasification – the derivation of fuel gases from coal. At IBM's Scientific Center in Palo Alto, California, Dr. Louis Lopez is directing the development of a computer model of the "moving bed" gasification process. This treats coal with steam and air or oxygen, which react with the carbon to produce a mixture of combustible gases: primarily carbon monoxide, hydrogen and a small quantity of methane (CH_4).

The challenge, Lopez points out, is to design an economic process: one that yields enough gas for the energy it consumes. This would offer major advantages over burning the coal directly: gas-burning industrial processes would not have to convert, and a natural-gas distribution system already exists. Moreover, burning sulfur-bearing coal produces a sulfur-oxide pollution that is difficult to control. But burning the gas produces a pollutant that is mostly hydrogen sulfide, and is much easier to extract.

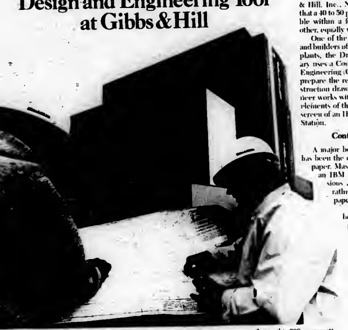
"Although simple in principle, the gasification process is extremely complex in physical detail," he says. "The yield is affected by the chemistry of the coal, the geometry of the moving bed and its velocity. The temperatures and volumes of steam and air or oxygen – among many other factors – are also significant.

Details are Important

"To be useful, the model must be quite detailed," he notes. "We start with equations for the general laws of the process. We end up with a mathematically complex model, for which a numerical solution is not easily found. If we make certain simplifying assumptions, many of the problems go away. But that's just what we don't want to do, these are important effects."

Today, scientists at the Palo Alto center have found methods to reach numerical solutions of such problems with reasonable amounts of computer time. "Once a process design with a good yield is found," Lopez adds, "there is a fresh set of complications: it won't scale up readily from a demonstration or pilot plant to a full-sized plant. The significant physical effects will all behave differently, and trial-and-error on an actual plant would be costly. Computer testing of tentative designs for a commercial plant should avoid millions of dollars worth of construction and operating trials."

Light Pen: A Powerful Design and Engineering Tool at Gibbs & Hill



Engineers at Gibbs & Hill, Inc., are designing electrical generation stations similar to this 600-megawatt coal-fired generating plant in Nebraska City, Nebraska, with the help of an IBM computer

"We are saving 25 to 30 percent of designer and engineer man-hours," says Frank D. Hutchinson, vice president of the Power and Energy Division of Gibbs & Hill, Inc., New York City. "We know that a 40 to 50 percent savings is achievable within a few years, and there are other, equally valuable gains."

One of the world's largest designers and builders of electric utility generating plants, the Dravo Corporation subsidiary uses a Computer-Aided Design and Engineering (CADAE℠) system to help prepare the required thousands of construction drawings. A designer or engineer works with a light pen, positioning elements of the drawing directly on the screen of an IBM 3251 Graphic Display Station.

Controlling a Flood

A major benefit, Hutchinson notes, has been the control of a rising flood of paper. Master drawings are stored in an IBM 3032 Processor and revisions are made at the terminal rather than by issuing a new paper drawing.

Superimposed views can be stacked or separated, he points out, to show spatial relationships or to check for interferences, such as whether cable trays conflict with piping.

"Elements can be rotated or moved within the drawing," he says. "Details developed at the terminal can be replicated with a touch of the light pen. We can ask the system to generate a scaled-up drawing of a congested area.

"Drawings are produced to scale in either English or metric units or both, which allows use of standard design elements on international and domestic projects."

The designer selects frequently used graphic elements and components from a standards library stored in the computer. To enter straight lines and curves, lettering and dimensions, he positions the light pen and touches keys.

"We can merge engineering computations with the drafting process," Hutchinson says. "For example, the computer can count the elbows and other fittings in a piping system and – based on the viscosity of the fluid – calculate the pressure drop and generate a pump specification.

An Immediate Gain

"A most important immediate gain," Hutchinson notes, "is the electronic transmission of drawings to the field on remote graphic display stations and full-size plotters, where reproducible drawings are generated within five minutes. Construction forces at the site can interrogate the drawings on the display station for added dimensions and views as may be needed.

"We're working our way toward an integrated system of documentation – drawings, reports, calculations and invoices – in which the output of one step will be the input of the next. Project managers track engineering and design work at headquarters, and keep track of work at the site, with the aid of the computer.

"Eventually," he adds, "they will eliminate today's masses of paper, using the computer to extract and present to engineers and constructors the information they need."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

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Extraterrestrial Menace

Satellite Data Needs Special Security

By Kap S. Kim
And Paul Woods
Special to CW

Cryptographic products are available to secure terrestrial data traffic for virtually any size of user. But in this first installment in a two-part series, the authors claim that few products presently offer extensive encryption capabilities expressly intended to support satellite traffic.

For background on encryption, see Computerworld's *recent Special Report on networks [CW, Nov. 26].*

Communications satellites are rapidly becoming an accepted and economical business tool for commercial and government organizations.

One question about satellite transmission, however, receives increasing attention: are there methods to keep others from gaining access to our data and from listening in on our conversations? How do we assure privacy of confidential information?

Satellite transmission has opened the door to new applications in distributed data processing because all satellite transmissions are essentially in the broadcast mode. This satellite broadcasting capability is also a great advantage to community antenna television (CATV) applications and other similar requirements.

Data is now rootinely transmitted at 56 bit/sec between user-dedicated earth stations located adjacent to DP equipment facilities. Such data networks, called Satellite Data Exchange (SDX), have gained commercial user acceptance since first placed in operation by American Satellite Corp. in 1978.

Satellite communications characteristically provide a much cleaner channel for data transmission than terrestrial links, if the latter are available at all at the higher data rates.

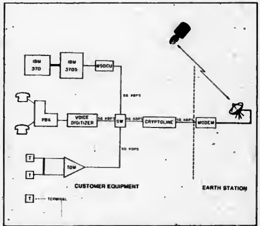
The SDX system was designed to operate with an accuracy that allows no more than one error in 10 million transmitted bits. This compares with an average of one error in one million bits now commonly experienced over terrestrial communications links.

Data transfer efficiency, or throughput,. can also show a marked improvement when transmitted over satellite links for the most common protocols, such as Hasp. Bisynch and Synchronous Data Link Control.

For example, American Satellite's Wideband Satellite Delay Compensation Units (WSDCU) are capable of improving data transfer efficiency over satellite links to a minimum of 94%, as compared with a typical 66% efficiency when the same data is sent over terrestrial microwave or radio channels.

Satellite communications allows easy information flow through

(Continued on Page 36)



High-speed satellite communications poses special security problems. A typical satellite network might be safeguarded as shown above using state-of-the-art gear, according to Kim and Woods.

IEEE Conferees Probe Facsimile Transmission

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — An experimental facsimile transmission system, embodying several features likely to come into general commercial use during the next few years, was described here recently by Hiroichi Teramura, deputy research director of KDD, Japan's overseas telecommunications carrier.

Teramura spoke at a technical session of the National Telecommunications Conference, held by the Institute of Electrical and Electronics Engineers (IEEE).

The system consists of a facsimile-type scanner, CRT display, keyboard, laser printer, microprocessors and diskettes. Text and graphics information is first pages on the CRT, after which the composite document is transmitted, page by page, to the receiving terminal.

But before the text is sent, it is automatically converted into Ascii or a similar character code. Each graphics image, meanwhile, remains in facsimile-coded format — which consists basically of a string of bits generated during successive horizontal sweeps, or facsimile-scanned and placed in diskette storage.

Desired text and graphics information is then composed into "raster scans," of the facsimile sensing unit across the image.

Faster Transmission

Reduced transmission time is a major benefit of the new system, Teramura said. It only takes about six seconds to transmit 3,000 typewritten characters in character-coded format at 4,800 bit/sec.

However, transmission time is 60 to 90 seconds — depending on the resolution desired — if the same information is transmitted at the same speed as a facsimile signal, that is, raster by raster.

(Continued on Page 40)

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Codex Introduces MPU-Based Voice Digitizer

MANSFIELD, Mass. — A voice digitizer that converts voice signals into a 2,400 bit/sec digital stream to reduce communication costs is available from Codex Corp.

A commercial encryption unit may be added to the Codex Digi-phone to enhance security of voice communications, the vendor said.

The microprocessor-based digitizer allows multiplexing of voice signals with data and other digital voice traffic and comes with an option for digitizing conventional dial and tone signaling to establish standard telephone access to the user's network.

With a system Codex calls Phone-guard, the user gets a Digi-phone, the Codex Info-guard encryption system and the vendor's LSI 24/24 modem in one unit.

According to Codex, Phoneguard is the first commercially available facility for full-duplex, secure voice conversation over a single two-wire dial-up connection.

Digi-phone costs $13,500 or may be leased for $725, $550 and $495 per month on a one-, two- or three-year plan, respectively.

Deliveries have already begun, Codex said from 20 Cabot Blvd., Mansfield, Mass. 02048.

Satellite Data Poses Special Risks

(Continued from Page 35)

the satellites, which are easily accessible. However, this easy accessibility may allow misuse. The threats to satellite transmission privacy can be generally classified as either active or passive.

A *passive* threat is the possibility of unauthorized reception without the system users or operators knowing that the transmitted data was copied.

In a satellite system, this could be accomplished with ease by receiving the satellite's transmission on the downlink. Once the information has been intercepted, it could be used to achieve competitive advantage.

Active threats are achieved through injecting or substituting into a transmission system data that may pass undetected by the users or the operator of the system. In a satellite, this could take place by trasmitting to the satellite from earth or transmitting from another satellite.

Data Encryption

The majority of satellite communications channels today operate on a single-channel-per-carrier basis with some front-end digital multiplexing.

Protection of this type of transmission configuration can be accomplished by data encryption. The implementation of cryptography is relatively straightforward in this case.

The National Bureau of Standards has published a Data Encryption Standard (DES), which has become the government standard as well as the unofficial industrywide standard in the past year or so.

DES encryption devices operating at rates of up to 9.6K bit/sec are already available as commercial product from two large modem manufacturers. IBM offers DES-based hardware supported by special software to run with its mainframes and data terminals [CW, Nov. 26].

Protocol Sensitivity

Protocol sensitivity is one drawback that most newly developed DES encryption devices have for satellite communications. However, American Satellite's Cryptoline was built to function with computer data as well as digitized voice at the high data rates used for satellite communications (see figure on Page 35).

The encryption device is normally sandwiched between a modem and a user's terminal. Introduction of any overhead data, which is usually requested for data link synchronization by the encryption device, would reduce the clock rate to the user's terminal. Without any overhead, the encryption device would have to depend on a certain control character of protocol to maintain data link synchronization.

The illustration shows a typical 56K bit/sec data link application. The Cryptoline is placed between the user's terminals and the modem. It takes the data stream from either the multiplexer, the voice digitizer or the WSDCU and encrypts it, using the DES.

The encrypted data stream then goes to the modem for transmission. At the receiver end, the encrypted data stream is taken from the modem and decrypted. The clear data is then provided to the multiplexer.

The 56K-bit/sec Cryptoline meets all requirements posed by the National Bureau of Standards for certification of DES equipment.

DES is apparently the strongest published algorithm readily available to commercial users.

Kim is American Satellite Corp.'s director of transmission engineering. Woods is principal engineer for Fairchild Space and Electronics Co. Next week: A look at how cryptography may address satellite communications of the future.

Turnkey System Collects Data from Multiple Stores

ORLANDO, Fla. — A turnkey point-of-sale (POS) system has been developed by Transaction Data Systems, Inc. (TDS) to collect raw data from multiple stores for processing.

At the end of a day's business, the NCR Corp. processor in each store automatically collects transaction data from the terminals and stores it for remote access by a Data General Corp. CPU. The software can be set up to poll the stores automatically over dial-up lines.

The POS package operates under Data General's RDOS and interfaces to a modified TDS Communications Access Manager to handle the data transfer from the in-store CPU. The raw data is then reformatted to IBM standard label tape for processing on the IBM 370 series CPUs.

Cost of the software alone is $24,000, including three days of training and two copies of software documentation. A small system, including the hardware and software needed to collect and transmit the data would cost at least $82,000, according to a spokesman.

TDS is located at 5750 Major Blvd., Orlando, Fla. 32805.

Asynchronous Terminals, Synchronous Modems Tied

NEWPORT, R.I. — Asynchronous terminals, with any character format, can reportedly be interfaced to synchronous modems with Avanti Communications Corp.'s 400 converter.

Avanti calls it a "one-of-a-kind" product because it is equipped with its own power supply and is independent of the modem. Data rate selection from 150 bit/sec to 39.6K bit/sec is via a 16-position front panel-mounted switch.

Another front panel switch selects character format, while a single red/green LED indicates either that the system is operating without error or that there are parity, framing or overrun errors, Avanti said.

Installation involves two RS-232C cable connections to rear panel connectors and an ac power cord connection.

The converter costs $295 each, Avanti said from Aquidneck Industrial Park, Newport, R.I. 02840.

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IEEE Conferees Probe Facsimile Transmission

(Continued from Page 35)

Another upcoming improvement in facsimile technology, Teramura said, is use of public data networks.

Telephone circuits, since they operate in half-duplex mode, require the sender of a facsimile message to wait for an acknowledgment after each block of text or graphics information is transmitted. This causes a significant increase in transmission time and communication costs.

Public data networks not only get around this problem, but also provide useful value-added features, such as store/-forward transmission, multi-addressing and interconnection of different terminal types, makes and models.

Teramura was the first of six speakers at a session on domestic and international facsimile transmission services.

The session chairman, B.I. Edelson of Communications Satellite Corp. (Comsat), predicted in his opening remarks that within five years transmission of graphics information would require use of about 30,000 satellite circuits — approximately the same number currently used for voice communication.

George White, of Xerox Corp., contended that five "tides" are likely to increase the use of facsimile and improve the related technology during the next several years. They are cheaper integrated circuits, rapid growth in the worldwide computer population, cheaper buffer and memory storage, growing use of satellites and improvements in facsimile printing techniques.

The U.S. and Japan are working hard on laser xerography, he said. Ink-jet printing is also receiving a lot of attention.

Other major trends include integration of facsimile and voice transmission and the development of terminals that integrate facsimile with related message transmission techniques such as on-line word processing and Telex.

Unresolved Issues

There are several unresolved policy issues, however, White added. Facsimile codes and formats have to be further standardized; the conflict in the U.S. between the Postal Service and commercial vendors of electronic message services has to be resolved; and an equitable cost-allocation scheme has to be worked out.

On this latter point, White explained that facsimile networks are characterized by high initial cost and low cost for each additional increment of capacity. He suggested that if the initial users pay all of the initial costs, later users will receive an unfair "free ride."

Dr. A.C. Schmidt, of Bell Labs, reported that an international standards-writing committee — CCITT Study Group 14 — recently agreed on a draft standard covering a coding scheme for digital (Group 3) facsimile machines.

This scheme is said to produce significantly greater compression of the transmitted information than the "modified Huffman code" in general use today.

Dennis Rose, of Satellite Business Systems (SBS), said his company's new facsimile terminal, now being built by AM International, (formerly Addressograph - Multigraph Corp.), shoold be ready for customer use by the first quarter of 1981 — about the time the SBS satellite network is scheduled to begin operation.

The terminal, among its other capabilities, will scan and print 30- to 60 page/min; produce hard-copy output with a resolution of 300 line/-in.; compress the scanned data 15 times "or more" before transmitting it; and offer automatic addressing, multicopy transmission from a single copy input and several other labor-saving features.

Documents transmitted through this system will be delivered no later than the morning after being sent, and far quicker in most cases.

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Honeywell Users Get Tool To Manage Flow of Data

WELLESLEY, Mass. — Honeywell, Inc. has announced a communications software package to manage the flow of information between a network of remote terminals and its mainframes.

The Remote Terminal Supervisor-II (GRTS-II) is an enhanced version of Honeywell's GRTS. It runs on a Datanet front-end processor connected to a 6000 series, Level 66, Level 66/DPS or DPS 8 system running current versions of the Gcos III or Gcos 8 operating systems.

GRTS-II functions with the network processor hardware to supervise remote operations within Honeywell's Distributed Systems Environment. It consists of a series of software modules that are linked through common subroutines and tables.

The modules control system loading, initialization, common interrupt processing, executive functions and device handling. Special categories of modules include file transfer, system dump and system macros, Honeywell said.

Compared with GRTS, GRTS-II offers expanded memory, buffer management, configuration, asynchronous speeds, load map messages, transmission rate recognition, message acknowledgement, debug and trace capabilities and master console log-ons.

The High-Level Data Link Control (HDLC) protocol is optionally available to control the line connecting the remote network processor with the front-end processor. GRTS-II will reportedly support a number of non-Honeywell terminals, including Teletype Corp. models 33, 35, 37 and 38; the General Electric Co. Terminet 300 and 1200; the Hazeltine Corp. 2000; and IBM 2741 and 2780 terminals.

GRTS-II and the HDLC option are priced at $210/mo and $90/mo, respectively.

Terminal System Backs 1100

RESTON, Va. — Users of Univac's 1100 mainframes can enter batch jobs remotely with a terminal system from C3, Inc. based on a 32-bit minicomputer.

The mini and a multitasking operating system called OS/32 form the basis of C3's Remote Batch Terminal (RBT). The vendor's C3NTR communications protocol provides bidirectional, full- and half-duplex synchronous transmission of Ascii, Ebcdic and Univac Fieldata files, a spokesman said.

Via dial-up or leased line facilities, the 1100 user can run multiple concurrent batch jobs at speeds up to 9,600 bit/sec. Device-independent facilities of the C3NTR protocol allow assignment of I/O streams to unit-record or mass storage devices under control of the RBT system operator.

That feature enables the spooling of incoming print/punch files to disk or magnetic tape and the transmission of batch job card image files from disk or magnetic tape or from standard unit record devices, the spokesman said.

The RBT runs with software to support IBM 2780/3780, 3270 and Hasp-controlled workstations, as well as with Univac's U100/U200 and DCT1000 software.

The basic RBT costs $37,500 with C3NTR software and documentation, the vendor said from 11425 Isaac Newton Sq. S. Reston, Va. 22090.

Ebcdic-to-Ascii Unit For Tektronix 4000

AUSTIN, Texas — Ebcdic data can be converted to Ascii and output in serial asynchronous format to and from most Tektronix, Inc. 4000 series devices with a converter from KMW Systems Corp.

The VAC-3270T allows operation of Tektronix equipment at high transmission rates and ensures error-free operation by using IBM 3270 protocol with cyclic redundancy check (CRC-16), a KMW spokesman claimed.

The converter with one port costs $4,250; up to two additional ports are available for $375 each. KMW Systems is at 8307 Highway 71 W., Austin, Texas 78735.

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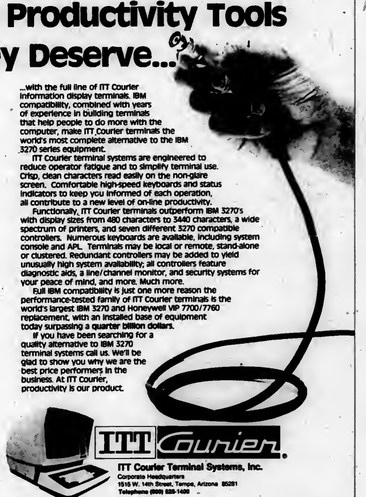

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College Finds Solution to Crowded Classrooms

By a CW Staff Writer

SANTA ANA, Calif. — A community college here is using terminals in an effort to overcome the predicament of crowded classrooms. The terminals enable the students to receive individual one-to-one tutoring.

Located in the library of the Santa Ana Community College, the 12 terminals are linked to two host computers in the main computer center.

Professors at the college have devised programs to supplement their courses in a wide range of subjects not limited to mathematics or computer science. Students can choose from about 400 such programs that help them review for tests or go over lessons covered in class.

"About 2,000 to 3,000 of the 25,000 students here use the terminals each semester," noted Dean R. Strenger, who heads the college's Science and Technology Department.

Santa Ana Community College has had terminals for seven years and plans to add more terminals eventually.

At present, the school has a total of 20 terminals as well as nine Lear Siegler, Inc. ADM-1s, three ADM-3s and 10 Digital Equipment Corp. Decwriter LS36s. These are hooked up to a 1.5M-byte Hewlett-Packard Co. 2000 minicomputer and a newly installed Honeywell, Inc. Level 66 mainframe.

"A student can use a switching device at the library terminals to decide which computer he wants to use," Strenger said.

The HP 2000 is dedicated to Basic, whereas the Level 66 can provide computer science lessons and practice in other languages, including Fortran and Cobol.

The full capacity and potential of the Level 66 has yet to be reached, but more terminals are planned in the coming year, Strenger said.

The terminals have caused no problems to date. Strenger said their easy maintenance was a deciding factor in choosing those particular models.

Unit Handles Color CRTs

SANTA CLARA, Calif. — The computer graphics game has gotten a little hotter with the introduction of Ramtek Corp.'s six-color FS 2500 color CRT controller.

The microprocessor-based character graphics system can display 254 characters and 64 foreground/background color combinatioo or eight levels of gray scale, according to Ramtek.

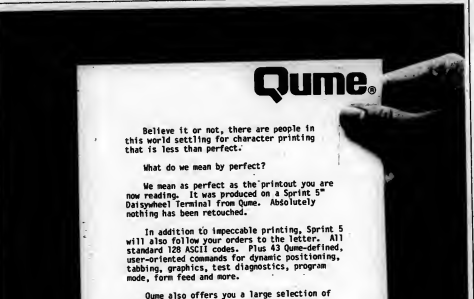
The FS 2500 delivers 64 upper case and 31 lower case Ascii characters in 10 by 8 dot matrix and a 12 by 9 field, a spokesman said. Semigraphics character sets include 2 by 3 element symbols, he added.

Symbols can be joined to build complex diagrams. A 12 by 9 dot matrix reportedly smooths out discontinuities, he said.

CPU-initiated commands erase the screen, directly address the beginning of any line and position the cursor to any character location within that line, according to Ramtek.

A serial bidirectional port offers communications interfaces for EIA/V.24, CCITT, RS-232C and 20mA current loop. The system accommodates switch-selectable speeds from 75- to 19.2K bit/sec. Parity is also selectable.

At power up, the system runs through a self-test and automatically erases the screen, while the microprocessor automatically restarts. With a 13-in. CRT (a 19-in. CRT is optional), the FS2500 costs $4,275 from Ramtek at 2211 Lawson Lane, Santa Clara, Calif. 95050.



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Center Moves From 360 to Omega

Benchmarks Make Upgrade Choice Easy

The Business Data Systems Division at the National Aeronautics and Space Administration's Langley Research Center recently upgraded from an IBM 360/50 to a Control Data Corp. Omega 480-II. This is the story of that upgrade.

By Andrew G. Swanson
Special to CW

HAMPTON, Va. — The biggest hurdles in upgrading our equipment were providing answers to two questions from my boss: "Why do you need it?" and "How can we afford it?"

Technical analyses of the current and projected work load and of the status of our applications software answered the first question. Technology, in the form of decreased CPU costs, came through in time to provide an acceptable answer to the second question.

Then the boss' principal question was, "How can we have a straightforward acquisition process?" Benchmarks and a clear definition of what we meant by a 370 or plug-compatible CPU provided the key answers.

Our data processing task is fairly typical of business DP in that we support functions such as accounting, budget, payroll, personnel and inventory management.

Our equipment now is a 2M-byte CDC Omega 480-II (We formerly used an IBM 360/50 with 256K bytes of IBM memory and 768K bytes uf Ampex Corp. add-on memory), 24 spindles of IBM 2314 disks,

(Continued on Page 52)

Results of Langley Tests

By Andrew G. Swanson
Special to CW

The results of the benchmark tests that we made prior to issuing a request for proposals to upgrade the system at Langley Research Center, together with the test results included with proposals, provide an interesting indicator of the relative performance of various CPUs.

As with any comparisons of CPU power, the results must be used with caution since they provide only one type of performance comparison yardstick. In the final analysis, what counts is the throughput of the actual job mix processed by the specific system of CPU and I/O devices that exist in an installation.

Figure 1 shows the CPU times required for tests of the CPU-bound benchmark (rounded to the nearest minute), while Figure 2 shows this data converted to performance relative to an IBM 4341.

We have found both the CPU- and I/O-bound benchmark tests to be of continuing value as reference measures when we make changes in hardware or software. For example, we were able to verify that the latest release of the microcode did provide modest performance improvements.

We have also used the tests as a quick preliminary check on the possible effectiveness of using IAM (marketed by Innovation Data Processing, Inc.) as a replacement for Isam. We expect them to help us assess some of the impacts of use of VM370 and MVS and as an aid in "tuning" these control programs.

CPU	CPU Time (Min)	Relative Performance
IBM 360/50	54	.24
IBM 370/148	24	.54
CDC Omega 480-II	22	.59
IBM 360/65	18	.72
Itel AS/3-3	17	.76

Figure 1

CPU	CPU Time (Min)	Relative Performance
IBM 370/155	16	.81
CDC Omega 480-II	15	.86
IBM 4341	13	1.00
Itel AS/4	12	1.08
IBM 370/158	9	1.45
Itel AS/5	8	1.45

Figure 2

SMP Ability Gives Decsystem-1090 Better Throughput

MARLBORO, Mass. — Digital Equipment Corp. has added full Symmetric Multiprocessing (SMP) capability to its line of Decsystem 1090 computers.

With SMP users can increase overall system throughput by up to 50% over the traditional master/slave dual-processor configurations available for the Decsystem 10 line, the vendor said.

With the multiprocessor configuration, up to 175 active jobs can be run on the system and up to 512 transaction processing or dedicated applications terminals can be accommodated, the firm said.

SMP was designed primarily for use with the Decsystem-1090, which is a dual Decsystem-10 configuration with a KL10 processor, or a Decsystem 1080. Single-processor systems can be upgraded in the field to the multiprocessor configuration.

In the SMP configuration, both processors are operationally equivalent with each performing both computation and I/O operations. Peripherals attached to either CPU can be used without regard to the central processor running the program.

The operating system is reentrant; monitor calls can be executed by either processor in the configuration, DEC said.

SMP configurations are available in a variety of packages. A minimum configuration Decsystem-1090 SMP, including two processors, 1M words of memory, one disk, 16 terminal lines and the SMP operating system is priced at $1,250,000.

Decsystem-1090s that currently operate in a master/slave configuration can be adapted to SMP in the field at prices starting at $10,000.

An existing Decsystem-1090 or 1080 can be upgraded to SMP for $400,000 and $442,000, respectively; in both cases the upgrade includes the second processor and SMP software. Additionally, the Decsystem-1080 is converted into a 1090 in the $442,000 SMP upgrade.

Shipments are scheduled later this month.

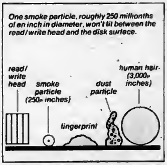
According to Joseph Viula, Decsystem-10 Product Manager, the SMP feature is particularly useful for applications involving large data bases, high availability and large numbers of users.

Inmac Offers Hints to Improve Handling of Magnetic Media

SANTA CLARA, Calif. — Microscopic smoke particles or fingerprints can loom like mountains before a disk's read/write head "flying" above the disk surface. And when the head "broadsides" such obstructions at 140 miles per hour, the resulting head crash can bring an entire system down.

Most data processing personnel are aware of the need to avoid head crashes. Tu put the facts in black and white for all to read, however, International Minicomputer Accessories Corp. (Inmac) has published 10 hints for improved magnetic media handling:

- Before using a new pack or cartridge, put it for at least 24 hours in the computer room where it will be used. This acclimates the media to the normal operating temperature and humidity. Failing to do this may hinder stabilization and track registration, according to Inmac..
- Keep hands and foreign objects, such as paper clips and pencils, off recording surfaces.
- Don't smoke. Smoke particles and tar can stick to head and platter surfaces. Fire risk is also increased.
- Keep top and bottom media covers assembled when the disk is not in use to stop dirt from getting inside.
- Don't stack packs on top of each other. They can slide off, and the resulting impact can cause platter misalignment.
- Carry packs and cartridges carefully. Secure cartridges firmly under your arm. Carry packs by handles.
- Clean metal hubs to keep oil and debris from accumulating.



One smoke particle, roughly 250 millionths of an inch in diameter, won't fit between the read/write head and the disk surface.

Microscopic debris on a disk's aluminum substrate can look mountainous to a read/write head flying along at 140 miles per hour, as this Inmac illustration shows.

- Have heads and platters cleaned and checked periodically.
- When labeling media, use nontransferable pressure-sensitive labels and felt-tip markers that don't leave grease or lead residues.
- Change disk drive air filters at least every six months.

Inmac, an independent computer acessories supplier, offers a free 70-page catalog, which includes magnetic media and media cleaning supplies. The catalog can be ordered from Department BPR, 2465 Augustine Drive, Santa Clara, Calif. 95051.

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And Moves From V/6 to V/7 to V/8

Insurer Gets 470, Eases 370's Processing Load

By Marguerite Zientara
CW Staff

DETROIT — Blue Cross and Blue Shield of Michigan solved its computer saturation problems last year by adding an Amdahl Corp. 470V/6 compoter to its IBM 370/168-3 multiprocessor system to relieve an average running capacity of 92%.

Although the move was designed to solve an immediate efficiency problem, it resulted ultimately in Blue Cross installing the first production model of the Amdahl 470V/8.

A rapid growth in claims volume and the corresponding increase in on-line activity for the insurance firm found Blue Cross running out of computer power in early 1978.

"During the hours of 7 a.m. to 5 p.m., our computer system was running at an average of 92% capacity and approached 98% during peak on-line periods," according to Frank Mrachina, vice-president of DP operations.

"We had difficulty supporting developmental testing and providing sufficient time for systems software tests, even though we utilized all the time available in our three-shift, seven-day-a-week operation," he recalled.

Tests had indicated that the health insurer's 370/168 did not have enough capacity to handle on-line growth or the demand for on-line testing for two large-scale applications that were then being developed. The first is a transaction-oriented claims pricing and acceptability system, scheduled for the end of 1979, which would allow changes in benefit structures to be made without recompiling programs.

The second is an on-line real-time membership and billing system scheduled for the first quarter of 1980, in which transactions will automatically update the corporate record on an IMS data base — a program designed to eliminate the delays associated with a paper-oriented system.

Only Vendor Considered

In looking for a new computer system, Blue Cross spoke to a number of local Amdahl users. It didn't even consider other manufacturers because it "did not want to get into a host of conversions from our IBM machine," Mrachina said.

Amdahl's plug and software compatibility were strong selling points for Blue Cross. "We sent a team to four different 470V/6 sites around the country to see the 470V/6 in action, and we were impressed with its speed, reliability and throughput," he said.

Because of the 470V/6's price/performance ratio, Blue Cross installed it in July 1978. The system is used in almost all aspects of Blue Cross' business, including on-line claims processing and inquiry, membership and billing and program development.

Blue Cross and Blue Shield of Michigan insures about 60% of the state of Michigan, or about 5.2 million people, with its largest subscribers being the automobile industry and Michigan Bell. In 1978, the group processed 49 million claims, had a premium income of $2.1 billion and benefit payments of 1.9 billion, the highest of any Blue Cross and Blue Shield organization in the country, Mrachina said.

Another Upgrade

All that business put a considerable strain on even the newly acquired Amdahl machine, and the firm started thinking again about its future DP needs.

"We simulated projected activity on the machines we had, as well as on the machines that were available," Mrachina said. "We found that we would quickly run out of capacity on the 370/168 system and would have had trouble on the IBM 3033.

"Using a combination of our simulation runs (Snapshot for IBM and Best One for Amdahl), vendor statistics, benchmarks from other users and significant computer industry reports, we determined that, in relative throughput based on [millions of instruction/sec] rates for about 25,000 transaction/hour, the 370/168-3 uniprocessor was equal to 1.0, the 370/168-3 multiprocessor was 1.5, the 3033 was 2.0 and the 470 V/8 was 2.7," he explained.

The firm decided to acquire two Amdahl 470V/7s, which would be field-upgraded to 470V/8s "as soon as possible." The first machine, which replaced the 470V/6, was installed last September.

In October, because the 470V/8 was ready for delivery sooner than expected, the insurer took delivery on one, eliminating the need to upgrade one of the two planned 470V/7s.

Current plans call for the 470V/8 to take over the batch and on-line claims processing and inquiry applications. The V/7, which has been used for development of the new systems, will eventually be field-upgraded to a V/8 and will handle the membership and billing application.

The current system consists of the 470V/7 and a 470V/8, both with 16 channels and 16M bytes of memory and the IBM 370/168-3 multiprocessor with 11M bytes of shared memory. About 1,050 terminals access nearly 20G bytes of on-line data. Blue Cross also has a Honeywell, Inc. 6660, primarily for Medicare applications.

Check the charts.
WANG beats IBM.

IBM recently announced two new computer systems, the IBM 4331 and 4341

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	WANG VS	IBM 4331	IBM 4341	WANG VS 100
Price	$37,000 (512K CPU)	$65,000 (512K CPU)	$245,000 (1.2 MEG CPU)	$93,000 (1 MEG CPU)
Performance Index	1.0	1.1	3.7	6.0
Comparable IBM System	138	138	148	158
Operating System	Multi-User Interactive	BATCH	BATCH	Multi-User Interactive
System Expandability	DP WP TP	DP TP	DP TP	DP WP TP
Cache Memory	N/A	8K Bytes	8K Bytes	32K Bytes
Memory Range	128K – 512K	512K – 1 MEG	2 MEG – 4 MEG	256K – 2 MEG
On-Line Disk Storage	2.3 Billion Bytes	9 Billion Bytes	18 Billion Bytes	4.6 Billion Bytes
Delivery Date	10 Weeks	1-2 Years	1-2 Years	12 Months

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Availability. The new TRS-80 Model II is on display at 50 Radio Shack Computer Sales/Service Centers and 100 specialized Computer Departments in major area Radio Shack stores. It's being delivered through our 7300 outlets on a first-come, first-served basis. Visit your nearest Radio Shack store for details or write the address below.

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Mini-Based Net Near Completion

System to Speed Weather Data to Forecaster

By Allen B. Lee
Special to CW

SUITLAND, Md. — For more than three decades, weather forecasters have been using computers to aid in weather predictions. Now, new computer technology is being adopted by the National Weather Service to speed information flow between offices.

This program, called Automation of Field Operations and Services (Afos), is being put in place at Weather Service offices across the nation.

While powerful systems here handle large-scale weather forecasting and data transfer between international centers, the task of moving weather information around the country has been done by teletypewriter and facsimile circuits. These slow systems hamper the forecaster in getting timely forecasts and warnings to the public.

The Afos backbone is a series of minicomputers installed at each Weather Service Forecast Office (WSFO) in the U.S. Generally there is one forecast office in each state, but a few states have two and Texas and Alaska each have three.

Each WSFO is a node on the National Distribution Circuit, a voice-grade telephone loop operating at 2,400 bit/sec. In case of a circuit failure between nodes, each computer can reestablish the link by "dialer around" the problem using commercial long-distance lines.

The new Afos equipment, now installed in more than one-third of the nation's weather offices, will mean faster issuance of forecasts and warnings to the public and better utilization of the time of the professional meteorologists using it. Although only in its initial stages of operation, the system is delivering weather maps to the forecaster as much as two hours earlier than on facsimile.

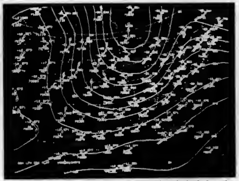
The weather maps needed at each office are kept in the system's data base, allowing the forecaster immediate access to his information. Alphanumeric products — forecasts, warnings and summaries — are also stored in the data base for his immediate recall. If a particular product is not available locally, the forecaster requests the information over the National Distribution Circuit, and within a matter of seconds the data is sent back to him from the office that originated it.

Hardware Configuration

Each WSFO is equipped with two Data General Corp. Eclipse S-230 minicomputers. One has 192K bytes of memory and the other has 128K bytes. The computers handle data flowing through the circuit on a store-and-forward basis, enter locally prepared data on the circuit, process data and programs needed by the forecasters and drive the Natiunal Oceanic and Atmospheric Administration's (Noaa) Weather Wire Service.

The Weather Wire is a teletypewriter circuit operated by the government to get forecasts and warnings directly to the news media. Although the Weather Wire is a slow, 75 wurd/min circuit, it offers the only low-cost method of delivering weather information to the news media.

Within each weather office are several consoles where forecasters prepare and receive data. Each console has a module fur alphanumeric data (ADM) and may have one to three graphic display modules (GDM) used for displaying weather maps.



Using the Afos system, a forecaster can select dashed, dotted or solid lines for each data field. He can make a hard copy of any display by pushing a button.

Each computer's data base and operating software are stored on a 10M-byte disk storage system. Each office has two floppy disk drive units for data archival and special on-station programs.

Weather service offices within each state each have a single minicomputer and are connected to their parent forecast office on a spur circuit. They maintain a limited data base and can request information through the forecast office if they have a special need.

With the system, forecasters can issue warnings in less than a minute, compared with several minutes needed using manually prepared teletypewriter copy. With a weather event like flash flooding, the time saved translates into more time for people to evacuate critical areas.

A second area of benefits from Afos is the elimination of nonmeteorological tasks. Forecasters have had to spend a lot of time tearing and filing paper from teletypewriter and facsimile machines. Under Afos, the paper piles will disappear from walls and tables.

The conversion to the new Afos system hasn't been without its problems. There have been some hardware interface problems, and considerable work had to be done to eliminate system crashes.

Shaky communications lines and poor operating software left a lot of forecasters with a bad opinion of the Afos system when tests were started in late 1978. Because of the problems, Weather Service managers delayed operational dates.

The latest tests look better, however, and managers are tentatively looking toward mid-1980 to implement the system. All Weather Service offices in the country will be operational by 1982.

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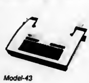

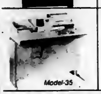

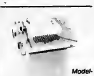

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Bank Finds Nonimpact Printer Wise Investment

JERSEY CITY, N.J. — A major commercial bank here is using a high-speed printer and its special paper to save thousands of dollars annually in the production of customer statements and internal reports.

The unit, a Honeywell, Inc. Page Printing System (PPS) with special roll-feed paper developed by Crown Zellerbach, has eliminated the need for $20,000 worth of custom stock forms and reduced from three to two and a half the number of shifts needed to turn out bank statements and reports each day, according to William Lipp, manager of systems and computer operations at The Trust Co. of New Jersey.

"Storing a large number of custom forms that eventually had to be decollated, burst and filed was a pain in the neck," recalled Lipp, who first saw the PPS perform at Hoffman LaRoche in Nutley, N.J.

"We first heard about the Honeywell system and the Crown Zellerbach paper two summers ago, and we didn't consider it too seriously. But the more we looked into it and the more our paperwork demands grew, the more we found we needed its flexibility for our operation."

Electrostatic Operations

In December 1977, Lipp chose the nonimpact system printer over others in an effort to ease the department burdens related to time, energy and finances. Honeywell's nonimpact printer operates electrostatically using the special paper.

Data and forms images are electrostatically conveyed to the paper as it passes through the page printer, and a liquid ink (toner) is drawn and bonded to the electrostatic images. The Trust Co. uses blue and white copies, but black and other toner colors are also available.

The system's magnetic tape which controls the imaging is compatible with equipment suppled by a number of computer manufacturers. At the Trust Co., the principal computers are two Burroughs Corp. B3700s.

A primary feature of the system, Lipp noted, is its ability to print time deposit statements, checking account statements, trial balance sheets and a myriad of internal reports without the need for printout carbons, which are often illegible.

Unlike the 1,100 line/min impact printer that it replaced, the Honeywell system prints up to 8,000 line/min and produces an original document on standard size paper.

"Before we purchased the PPS, checking account statements had to be burst and decollated before they were sent to bookkeeping for stuffing with canceled checks," the bank systems manager said. "Now the statements come off the PPS each an original and precut to the right size. They go directly to bookkeeping two to three hours earlier than in the past."

With the impact printer, Lipp previously had to retain a file copy of all reports. But because the PPS magnetic tape print files are the same format as required for computerized output microfilm, the tape is sent to a computer output microfilm service, where it is placed on microfiche for compact storage.

Day and Night

With on-line terminals in all of its 19 branches, the bank processes all transactions and inquiries during the day. "When the system goes off-line at night, we prepare printer backup tapes containing the day's transactions and print out reports on the PPS," Lipp said. "This has helped us reduce our shifts in producing reports and statements for the following day."

Internal information, including mortgage and loan reports, are in the hands of banking officials the following morning.

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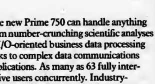
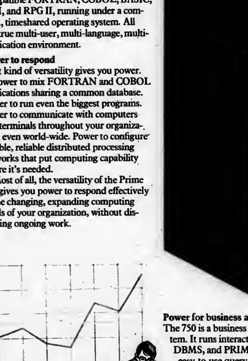
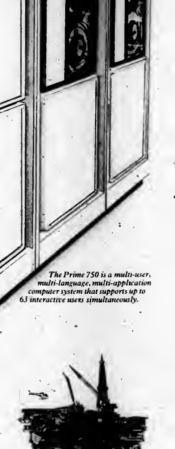




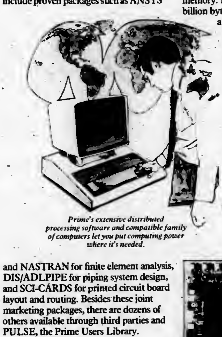
Sophisticated business modeling systems are among the packages available through Prime's joint marketing program.



Big, number-crunching engineering analysis programs run interactively on the 750.

atility is power.

For engineering applications
The same 750 that runs your business programs can simultaneously operate as a FORTRAN system that thrives on hairy computational jobs. A growing list of the most demanded engineering software packages—most of which previously ran only on batch-oriented mainframes—can now run interactively on the 750. They include proven packages such as ANSYS and NASTRAN for finite element analysis, DIS/ADLPIPE for piping system design, and SCI-CARDS for printed circuit board layout and routing. Besides these joint marketing packages, there are dozens of others available through third parties and PULSE, the Prime Users Library.



Prime's extensive distributed processing software and compatible family of computers let you put computing power where it's needed.

For distributed processing
The 750 can also be a versatile building block in distributed processing networks, supported by one of the broadest ranges of distributed processing software available. PRIMENET,™ our networking software package, allows local and remote communications on private lines, and is X.25 compatible for domestic and international packet switching as well. In IBM 3270 environments, DPTX, our Distributed Processing Terminal Executive, provides smooth, no-risk transition to distributed processing.

Tools to get the job done
While it offers the ease of use and flexibility usually associated with small computer systems, the 750 is equipped with features that put it clearly in the mainframe class in performance.

It's designed around a full 32-bit central processor architecture and comes with up to 8 million bytes of error-correcting main memory. Disk storage of as much as 2.4 billion bytes is available. And the 750 is a virtual memory computer that gives each of its maximum 63 users as much as 32 million bytes of virtual storage.

Plus a compatible family of computers
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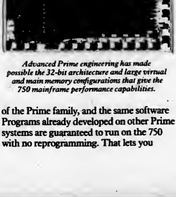

Advanced Prime engineering has made possible the 32-bit architecture and large virtual and main memory configurations that give the 750 mainframe performance capabilities.

One notable exception
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Benchmarks Make Upgrade A Straightforward Process

(Continued from Page 43)

seven Storage Technology Corp. 3400 series tape drives and three printers (two IBM 1403s and one IBM 3211). Disk upgrade to a "3350 type" is planned.

The operating system is OS/MVT (with conversion to MVS planned after VM370 and another 2M bytes of memory are installed).

Almost all processing is batch, mostly with sequential files; there are a few Isam files in some applications. A rudimentary on-line query system supports about eight "customer" terminals.

The software is old and difficult to maintain or enhance. Redesign is needed, but this is clearly a multiyear task that is planned to be done in conjunction with the use of a data base management system. We regard the CPU upgrade as the key initial step in the planned evolutionary improvements to hardware and software.

Prime Performance Measure

One of our major application systems, which is primarily an accounting system, is very CPU-bound and has several lengthy processing steps. This sytsem generated about one-fourth of our 360/50 workload.

At fiscal year-end, when the files are largest, total CPU time for this application on the 360/50 was in the 15- to 18-hour range; a major sort step took four to six hours of elapsed time. The fact that this application is very CPU-bound led us to the concept of using it, in an abbreviated version, as the prime measure of CPU performance in the competitive acquisition process.

Key programs for this application, together with representative test data, formed the performance benchmark. The CPU-bound nature of this benchmark is illustrated by the fact that when processed stand-alone on the 360/50, the CPU time was about 54 minutes and the elapsed time was about 56 minutes.

Since this benchmark was representative of one of our major applications, it also served as a software-compatibility benchmark test.

In the request for proposals (RFP), the performance requirement was straightforward. A proposed CPU had to process this benchmark at least three times as fast as the 360/50 — that is, with no more than 18 minutes of CPU time. No "bonus" was available if the proposed CPU was faster than this minimum requirement, which was based on the analysis of projected workloads, since putting a dollar value on increased speed was not in accord with the dictate that the acquisistion process be straightforward.

Four More Benchmarks

We also had four other benchmarks which the bidder had to process successfully. One consisted of representative programs and test data from our I/O-bound payroll/personnel system. The principal purpose of this test was to assure compatibility with packed-decimal (Comp-3) calculation.

Some CPU- and elapsed-time limits (fairly liberal) were also prescribed. This benchmark took about 10 minutes of CPU time and about 40 minutes of elapsed time when processed stand-alone on the 360/50.

The third benchmark test required that the CPU-bound and I/O bound benchmarks be processed in a multiprograming mode (with time restritions) to help assure us that the "overall horsepower" of the proposed CPU would be consistent with the performance level measured, by the CPU-bound benchmark.

A small assembly language program and several Cobol compiles (selected from a spectrum of all of our application systems) were the last two benchmarks; these provided additional measures of software compatibility. Programs and data were provided to prospective bidders so that they could include benchmark test results with their proposals.

We tested all of these benchmarks before we issued the RFP to be sure they could be processed successfully on several different 370-type machines. We had to make a few minor changes to normal production JCL and file structures so that the benchmarks would process successfully under MVT, VSI, SVS, or MVS and with 2314, 3330, or 3350 disks.

There was virtually no difference in required CPU time when this benchmark was processed under different operating systems, or with different disk drives, in the same model CPU.

Other aspects of the RFP were straightforward. The requirements for a 370 CPU, or "370 plug compatibility," were essentially statements reflecting manufacturers' claims (e.g., "work under MVT, MVS, VM370; has Dynamic Address Translation; is compatible with IBM 360 and 370 program products and peripherals," etc.).

Key additional requirements were 2M bytes of memory that was expandable to at least 3M bytes, no magnetic core-type memory (so that we could rule out some types of used obsolescent 370 equipment), four byte-multiplexer channels and air-cooling only.

Bidders also had to define, for the proposed CPU, a guaranteed maximum five-year life-cycle cost of purchase, hardware maintenance, operating system software maintenance and electric power.

The criterion for winning the competition was basically the lowest price (five-year cost) bidder who could meet benchmark test requirements. Final acceptance test criteria after installation were basically requirements for a successful repeat of the benchmark tests plus a 97% effectiveness level of operation over several days of successful processing of routine work using our existing peripheral equipment and applications software.

Our RFD was issued late last February, the contract was awarded to CDC in late June, the Omega 480-II was delivered in early August and acceptance tests began (and the machine became our operational CPU) in mid-August.

We have been very satisfied with the machine. Performance has been about as predicted by the benchmark tests, with applications systems CPU time reduced by the factor of about 3.5 predicted by the CDC benchmark.

Swandon is chief of the Business Data Systems Division at Langley Research Center.

'Conceptual' Approach Coming

Users Seen Skimping on Staff Training

By Tim Scannell
CW Staff

BOSTON — Small business users spend thousands of dollars on hardware and months on equipment installation but often skimp when it comes to the most important part of a successful computer operation — staff training.

On the average, employees put in about two days of classroom work before they are placed in front of a keyboard or console and asked to run a sophisticated data or word processing system, Everett L. Butler, executive vice-president of Universal Training Systems Co., said. And the training they do get is force-fed volumes at a time as managers try to have workers "eat the whole elephant at one sitting."

Speaking at the recent International Conference of Wang Users here, Butler outlined some procedural training methods used today, comparing them with the conceptual learning practices that will dominate the '80s. He also mentioned a number of teaching tricks used by his Illinois-based firm, which is staffed by about 37 industry experts who use their skills to develop customized training programs for new and seasoned users.

Different Rates of Learning

The main thing to remember when training potential system users is that people learn at different rates, Butler stated. But even though some people may take a little longer than others to understand a specific operation, productivity will not necessarily suffer. In fact, managers may discover that the extremely slow learner is frequently the more productive worker.

Presently, most training programs are very structured and rely on a step-by-step process not unlike "putting beads on a string by color," Butler continued. Personal achievement is based on an individual's memory capacity and rote prowess rather than a basic understanding of what pushing a certain button does within the computer system.

By contrast, the next decade's teaching approach will be concept-based and consist of a "guided discovery" tour from initial system input to final printed product, the educational specialist claimed. Users will be introduced to the whys and wherefores of the computer before they have a chance to touch a keyboard and apply what they have learned. These types of lessons will then be followed up by operational practice to ease any user apprehensions and hone textbook and classroom skills.

CW Photos by T. Scannell

Everett L. Butler

Sprinkling his lecture with facts about human anatomy, Butler stressed that user training should cater to both sides of a person's brain — the side more adept at number concepts and the other geared for holistic thoughts. Managers should take this into account and use a variety of visual and graphic aids to supplement terminology training, even before the computer system is actually seen.

By not plunging into direct hands-on training, trainers can help the users' initial visual and textbook experiences "become a mental framework on which they can hang information for a long, long item," Butler claimed.

Although it may seem simplistiitc, the user should be given a number of "paper-and-pencil" exercises and "what-if" logic prob-

(Continued on Page 56)

Beans, Terminals: Wang Users Meet in Boston

BOSTON — Baked beans and terminals, New England lobster and word processing equipment.

Although these items aren't normally grouped together, they shared the same stage recently at Wang Laboratories, Inc.'s International Conference of Wang Users. About 780 people showed op for the three-day meeting, which featured a variety of sessions on topics ranging from basic business processing to multilingual word processing communications.

While most of the attendees agreed that the presentations were right on target, especially those prepared by Wang personnel, there were a few minor complaints. For instance, a manager who spent 36 hours traveling on a jet from Indonesia commented that many of the most popular sessions took place in rooms that were too small and the least popular speeches were presented in rooms too large.

In addition, a systems manager from Washington, D.C., stated that many of the session titles didn't accurately reflect the speaker's topic.

On the whole, though, everything went very smoothly. In fact, quite a few participants remarked that they will try to attend next year's meeting and will invite along some of their colleagues to take advantage of the technical potpourri.

Users Urged to Put WP Gear To More Processing Tasks

By Tim Scannell
CW Staff

BOSTON — Although most companies believe they are prepared to travel the next decade's road of office automation, a few may be in danger of falling by the technological wayside.

Managers have spent countless dollars on researching and implementing sophisticated word processing (WP) and information retrieval systems that are currently being used to carry only about 20% of the office work load. In short, these systems do little more than get papers and letters to management a little faster, according to Amy Wohl, a principal with Integrated Technologies, Inc. and an expert in the office automation field.

Addressing a session at the International Conference of Wang Users, which took place here recently, Wohl cautioned WP vendors and users to "wake up from their slumber" and discover that their systems can do data processing and are not just glorified typewriters. In order to prevent today's WP wonders from becoming tomorrow's dinosaurs, users will have to integrate them with other equipment and use them as simultaneous multifunction, rather than dedicated, systems, Wohl said.

However, a number of problems face the resourceful manager who wants to be technically prepared for the '80s. First, although vendors seem to be in the same business of providing WP and information retrieval products, each one is operating within a separate automated world. Machine manufacturers are careful to build and program their equipment to run with similar equipment, but not with other vendors' systems. They have left out that "special kind of glue called communications," which permits one company's system to talk with another's, in favor of a variety of unique standards and processing codes, Wohl explained.

Amy Wohl

(Continued on Page 56)

Quay Offers Turnkey System

FREEHOLD, N.J. — Quay Corp. has introduced a turnkey disk-based microcomputer system designed for business or industrial applications that works with a variety of high-level languages and features up to 6.4M bytes of disk storage.

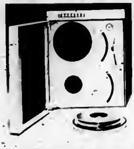
They Quay 900 incorporates a Z80-based single-board computer and two quad-density direct-memory-access-controlled floppy disks. The desktop unit has 48K bytes of randum-access memory, expandable to 65K bytes, and runs with Digital Research, Inc.'s CP/M disk operating system. The microcomputer also has a programmable read-only memory resident boot program, a spokesman said.

The 900 includes either an RS-232C or 20mA serial port and has a Centronics Data Computer Corp. compatible line-printer interface. RS-232C or programmable parallel ports and an S-100 bus adapter for external system expansion are optionally supplied, the spokesman continued.

The micro system costs $4,995, with quantity discounts available for five or more orders. Quay can be reached through P.O. Box 386, Freehold, N.J. 07728.

General Automation Unveils Tape, Disk System

ANAHEIM, Calif. — General Automation, Inc. has unveiled both a magnetic tape subsystem, capable of operating up to four transports, and a disk subsystem that can store about 600K bytes of data per diskette.



The 3442 Floppy Disk Subsystem

The 3431 Magnetic Tape Subsystem

The 3431 tape subsystem uses a switch-selectable 9-track phase-encoded 1,600 bit/in. or NRZI 800 bit/in. format and operates at 45 in./-sec. The subsystem controls the four synchronous transports from a single controller and formatter and can transfer data at rates up to 72K byte/sec, a spokesman claimed.

The tape unit features separate read/-write heads with automatic single-bit error correction and is totally compatible with IBM, Ansi and Ecma standards. The transport's electronics are contained on a single printed circuit board. Built-in system tests permit off-line troubleshooting.

The 3442 two-sided, single-density disk subsystem has a transfer rate of 250K bit/sec and can handle up to four drives for a total storage capacity of more than 2M formatted bytes. The disk unit includes autumatic track verification and write protect features.

A single drive tape subsystem costs $13,950, while a one-drive disk subsystem sells for $3,700. Quantity discounts are available, the spokesman noted from 1055 South East St., Anaheim, Calif. 92803.

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Kit Adds Q-Bus To DEC VT100s

TUSTIN, Calif. — Digital Equipment Corp. VT100 terminal users can convert their CRTs into PDP-11/03-compatible, LSI-11-based minicomputer systems through a do-it-yourself kit supplied by Transduction, Inc.

When installed in the DEC terminal, the TR-QB kit provides four LSI-11 option slots to accommodate CPU, memory, serial line and floppy disk interface modules. The terminal becomes a stand-alone computer system with the future capability of LSI-11 Q-Bus expansion, a spokesman claimed.

The kit includes a backplane assembly, cooling fan, mounting hardware, line time-clock printed circuit board and wiring harness. DEC LSI-11 modules and a dual-drive RX02-compatible floppy disk drive can also be included with the conversion package.

The kit costs $350, including detailed installation instructions, from Transduction at 14761-A Franklin Ave., Tustin, Calif. 92680.

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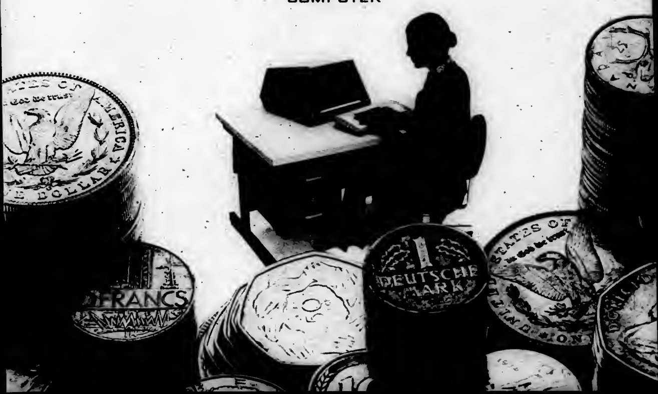

Users Urged to Integrate WP Gear

(Continued from Page 53)

While vendors could decide upon an across-the-board protocol, familiar to every system, the automation expert warned her audience not to "hold your breath" for that particular action. Vendors could also set up a committee, of which there are several functioning now, to decide which protocol to adopt. But that could take months, if not years, Wohl stated.

The only way for any action to be considered more than a paper ruling is for a large company, such as IBM, to take the initiative and decide upon a standard protocol. More than likely, the smaller manufacturers will follow suit and jump on the same communications bandwagon, she said.

If the vendors don't spearhead any action, the user might be able to go the "black-box" route and install protocol translators between noncompatible systems. The only problem is that these boxes cost upwards of $10,000, which is outside the bounds of most small business user budgets, she noted.

Like any office, the totally integrated office will have to have an effective and knowledgeable manager who is familiar with both DP and WP operations, Wohl continued. Unfortunately, these information systems or resource managers are scarce and most companies waste time searching for the nonexistent person who has "89 years of DP experience, 79 years of WP experience. . . and the ability to build a PABX system."

The people most likely to fill these managerial positions today will probably have more of a DP than WP background simply because they are more at ease with the technology, Wohl noted. But if integrated office systems are designed with too heavy a DP hand, she warned, the system's complexity may require more operator training than the office chore is worth.

Strict DP people are usually too caught up with their large mainframe "beasts" and tend to talk and write in "something not resembling English," Wohl said. Designers have to be conscious of the fact that non-DP individuals, like those in senior management, may be interacting with the system and will not take the time to become entangled in useless jargon.

Problems of Distribution

Finally, Wohl pointed out that while the distributed processing wave of the past few years helped to bring the computer to more people, it also created its own problems for office automation. Managers who were left to choose their own equipment and set up their own file systems are discovering that their mechanical pieces are not fitting into the total DP/WP picture.

Describing this dilemma as a "controllable problem," Wohl observed that managers should be careful to enforce some level of compatibility control so they will "at the very least be able to pass information from one part of the system to another."

Wrapping up her discussion, the office automation specialist spotlighted the need for "larger, cheaper storage systems" that will eliminate paper from the office scene. Electronic mail and filing equipment, multilanguage character scanners and voice input devices were also mentioned as tools that will promote integrated computeriztion, particularly from an upper management standpoint.

Interface for LSI Micros Provides 64 I/O Lines

MAYNARD, Mass. — Digital Equipment Corp. has unveiled a high-density parallel interface for its LSI-11/23 and -11/2 and PDP-11/23 and -11/03 that provides up to 64 I/O data lines.

The DRV11-J module features a programmable interrupt structure with bit interruptibility on up to 16 lines. The interface's lines are organized into four ports and the data line for each port is program-selectable, reportedly requiring no hardware alteration.

Users may choose up to 16 processor interrupts: bit interrupts on 16 data lines or four I/O interrupts and 12 bit interrupt lines. The unit was designed for sensor I/O applications requiring real-time response and can also be used as a general-purpose interface to custom devices. The device will drive up to 25 ft of shielded cable, a spokesman said.

The interface costs $420 from the firm at 146 Main St., Maynard, Mass. 01754.

'Easy to Operate? It's as Easy as Pi!

Users Skimp On Training

(Continued from Page 53)

lems to test basic comprehension. Studies have shown that by drawing a problem on a piece of paper, people can recall solutions and techniques better than 90% of the time, Butler said.

Tips on Documentation

Above all, system educators would do well to shy away from handing the user the computer's documentation without some kind of orientation because this can not only turn the session into a boring "technical treatise" but also leave a lot of training gaps and misconceptions, Butler warned.

Rather than being an organized collection of terms, documentation should be signpost-oriented, offering the neophyte user ready reference and transparent and consistent explanations, he suggested.

Finally, Butler noted that although vendors are responsible for providing concept-based operation instructions to their customers, the course graduate or user must provide secondary audience training. Since the users will be in contact with the system each day, they should be the ones who keep department heads and senior management informed on operational techniques and developments.

After all, "them that has the knowledge has the responsiblity," Butler reminded his audience.

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- [illegible] with RES
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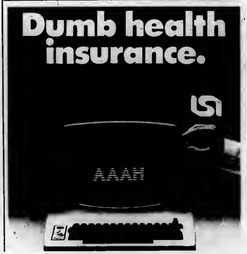

Market Seen at $50 Billion in '90

Golden Decade Forecast for Small Systems

By Marcy Rosenberg
CW Staff

LAS VEGAS — For small business system vendors in the next decade, thy coffers may well runneth over.

Already-declining equipment acquisition costs will plunge to new lows, program execution speeds will triple, system use will approach child's play, reliability will be enhanced and repairs will come easier and faster.

All this — and seemingly limitless prospects, too, for minicomputer- and microcomputer-based small business systems priced at less than $100,000, according to the market development manager for Digital Equipment Corp.'s Commercial OEM Group.

CW at Comdex '79

Speaking at a recent Comdex '79 session here, Gene Calvano called this market the fastest growing in the world today. Projecting a $3.5 billion business next year, he predictes the market will leap to $13 billion by 1985 and reach a whopping $50 billion in 1990.

Calvano's estimates of unit shipments also boggle the mind. More than 60,000 units will be shipped in 1980, climbing to over 500,000 in 1985 and soaring to some three million 10 years from today.

No matter how unfathomable they seem, these numbers will be within reach, considering the buying potential. Looking at businesses with revenues of more than $100,000, Calvano sees over two million prospects today and only 120,000 installations — a 6% saturation level, he pointed out.

Looking five years ahead, Calvano said these prospects will number 2.5 million, but only 1.4 million installations will exist — little more than a 50% saturation level.

Over and above these prospective customers, small business system vendors will find fertile ground for first-time sales to some 12 million companies with revenues under $100,000, Calvano predicted.

Bitten by the Bug

According to Calvano, the computer bug will bite businesses of all sizes for reasons well-known to the industry: service-oriented, cost-sensitive and paper-intensive industries alike will look to the computer to increase customer service, control costs and reduce manual paperwork.

While computers always dangled these benefits in front of users for the taking, cer-

(Continued on Page 60)

Exports Approach Last Year's Total

WASHINGTON, D.C. — Exports of computers and business equipment in the first three quarters of 1979 nearly matched the favorable balance of trade for these products during all of 1978.

Through September, exports of these products exceeded imports by $2.86 billion, compared with the favorable balance of $2.87 billion in the four quarters of 1978, according to statistics compiled by the Computer and Business Equipment Manufacturers Association (Cbema).

Representing 82% of the industry's third-quarter exports, computers and related DP equipment exports reached $1.35 billion during the quarter, an increase of 26% from a year ago, Cbema reported.

Within the computer category, exports of digital computers and CPUs rose from $306.9 million to $356.8 million, data processing terminals from $113.8 million to $147.5 million and parts from $384.1 million to 520.7 million.

During the third quarter, the industry's positive balance of trade gained by 36.4% from the corresponding period a year ago, rising to $1.02 billion from $748.9 million. This excess of imports over exports was the largest since the third quarter of 1975, Cbema noted.

DG Puts Out Official Word: It's Entering Retail Business

By Marcy Rosenberg
CW Staff

LAS VEGAS — Data General Corp. formally will enter the computer retail business by the first quarter of next year.

The firm is putting together a retail distribution program for its Micronova systems. The effort is being directed by Greg Fallon, recently brought on board as the firm's first retail distribution manager.

DG's recognition of and commitment to the retail distribution channel for small business systems is the only comparison that can be drawn between it and arch rival Digital Equipment Corp. DEC plunged into the computer retail market about a year ago through company owned computer stores.

DG's retail marketing strategy will differ markedly from DEC's, Fallon emphasized in a recent interview here. The firm plans to move Micronovas to local owner-operated, independent retail outlets through an independent network of stocking distributors it is in the process of building. Fallon defined DG's target retail customers as small businesses with up to about $10 million in revenues and staffs of 40 employees or less.

DG has tested this sales avenue before. In the past, it sold Micronovas to The Computer Store's distribution arm and through The Phoenix Group and The Computer Factory. The new program will formalize DG's retail effort.

Fallon would not name the distributors and retailers his firm is trying to enlist, but did indicate that likely distributor candidates would be those located in DG sales office regions to facilitate field and systems engineering support by DG to the distributor.

Unlike DEC, DG will not provide packaged software. Instead, it will depend on its distributors to supply applications packages. The firm is not planning to endorse any one of the number of houses that offer Micronova software.

As far as retailers go, Fallon said his firm may or may not continue past relationships, but is also considering other outlets such as office products dealers.

For DG, the advantage of the independent retailer is that it already has a built-in cus-

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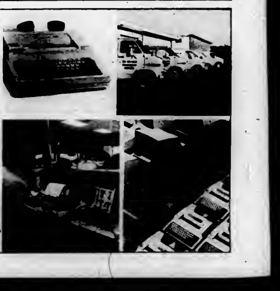

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Vendors Seen Using More Independent Reps

CW at Comdex '79

By Marcy Rosenberg
CW Staff

LAS VEGAS — Climbing interest rates and ever-increasing leasing, labor and inventory costs are forcing computer equipment manufacturers to lean more heavily on independent sales organizations to market their products.

As a result, commercial OEMs, distributors and retailers can look forward in the next five years to growing business opportunities in the small business system and computer peripheral product sectors, keynote speakers told Comdex '79 attendees here last week.

Commercial OEMs, for example, have captured 15% of the $2 billion worldwide market for small business computers, up from 0% barely five years ago, according to Irwin Jacobs, vice-president of Digital Equipment Corp.'s Commercial OEM group.

And as that market — for small business systems costing between $20,000 and $250,000 — mushrooms to some $6 billion by 1984, so will the OEM marketing channel expand about 36% yearly, ootstripping the growth rate for direct sales penetration, he predicted.

No Longer 'Screwball Idea'

Similarly, computer retailing has developed from "a pretty screwball idea" in 1977 into a viable marketing strategy that is "beginning to attract the big boys," Bob Rogers, president of retailer Compushop, Inc., maintained.

Embracing the retail concept — where the buyer comes to the seller — are IBM, which markets its 5110 desk-top computer system through 70 walk-in demonstration centers; DEC, with plans to open 200 computer retail stores; some 50 Tandy Corp. outlets pushing the Radio Shack TRS-80; and independents such as Compushop and Computerland.

In addition, Data General Corp., Atari and Hewlett-Packard Co. are said to be readying products tailored to retail selling, Rogers remarked.

What is attracting these firms to retailing is a market that is expected to skyrocket to $3.5 billion in 1983 from $330 million worth of computers sold through retail this year.

Several Attractions

Manufacturers are turning to independent sales channels for a number of reasons, according to Dennis J. Cagan, president of The David Jamison Carlyle Corp., a national distributor of terminals, data communications devices and small business systems. Among those reasons are:

- Independent sales organizations are easier to cost-justify than a direct-sales organization that carries overhead including costs of product parts inventories, personnel and lease financing.
- Although a well-run captive sales force can be more effective than independent marketing arms, the in-house sales organization is, at the same time, hard to hire, train, motivate and keep.
- Independents can take over the responsibility of customer hand-holding when it comes to developing and tailoring systems to users' needs.

Despite a rosy business outlook for the independents, the reseller/manufacturer relationship must fulfill certain needs for both parties.

What the OEM requires from the manufacturer, Jacobs said, are good field service, a compatible family of products, strong research and development, competitive product features, good discounts and programming development tools.

In turn, he believes the reseller should assure the manufacturer a high level of customer satisfaction, stable business practices, product and service uniqueness and be a predictable supplier. In addition, the independent sales organization must hire skilled software and financial personnel and adequately price products to ensure that its investment in software is profitable.

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More than a computer company

Beset by Rising Marketing Costs

Microage Computer Stores Offering Franchises

By **Jeffry Beeler**

CW West Coast Bureau

LAS VEGAS — A chain of retail computer stores has launched a nationwide franchise program in an attempt to contain its rising marketing costs.

Announced recently at the Comdex '79 show here, the plan means a new distribution channel for Microage Computer Stores, Inc., which until now has confined its sales efforts to six company-owned retail outlets.

In essence, the program permits independent entrepreneurs to establish, own and operate their own computer stores under a 10-year licensing agreement with the franchising organization. The arrangement, which is renewable every five years, calls for a $50,000 initial cash outlay and a $105,000 to $150,000 total investment from each franchisee.

In return for their capital investment and a 4% royalty on gross sales, franchisees will be allowed to operate under the Microage name and will receive exclusive marketing rights within an assigned territory.

Franchisees will also receive more than 100 hours of training in systems operation, store management and sale-closing techniques. The training course will last three weeks and take place at Microage's Tempe, Ariz., Learning Center.

Assortment of Vendors

During the next two years, Microage plans to establish some 100 franchises, each exemplifying a "systems-and-solutions" approach to computer marketing, according to its chairman, Alan Hald. Under the Microage sales scheme, each franchise's product line will consist almost entirely of microcomputers and associated peripherals representing a wide selection of vendors including Apple Computers, Inc. and North Star Computers, Inc.

The large product assortment will give customers the hardware and software building blocks they need to configure systems tailored to their individual needs and applications, Hald explained.

Although hobbyists will undoubtedly account for a large share of the franchise chain's total business, Microage plans to gear its marketing plan primarily to commercial and professional users, particularly first-timers, according to President Jeffrey McKeever. Roughly 70% of the program's total sales are expected to go to accountants, lawyers and small businesses with annual revenues of less than $10 million.

McKeever and Hald expect their franchise program's main competition to come from the Digital Equipment Corp. retail chain and, to a lesser extent, from outlets operated by firms like Computerland, Inc. and Byte Shops, Inc.

Different From Others

Although Microage is hardly the only or even the first organization to enter the computer-retail-store arena, McKeever and Hald feel their nationwide franchise plan differs from competing programs in several important respects.

First, the Microage plan includes an ongoing education program that reportedly gives franchisees access to new market information and keeps them abreast of emerging market trends.

Hald sees this continuing education, which will come primarily in the form of a monthly newsletter, as crucial to the success of his firm's franchising operation. "Many computer stores lock themselves into a particular perspective, and then when the market changes, they find themselves left out in the cold," he said.

Another franchisee feature that separates the Microage program from most rival plans is its use of modular fixtures to tailor each outlet's decor to its dominant clientele, McKeever added. A store that caters primarily to professionals, for example, would differ substantially in appearance from one that sells mainly to hobbyists.

CW at Comdex '79

McKeever described Microage's upcoming franchises as "third-generation" stores in which the distinguishing retail feature is an emphasis on flexible application programs. As part of its standard product line, the franchise chain will carry Microage's Microsource application software, which is compatible with various microcomputer models, McKeever said.

Like their third-generation counterparts, "second-generation" computer stores strongly emphasize business computing, but they lack an extensive repertoire of application software, McKeever said.

"First-generation" stores, meanwhile, appeal mainly to computer hobbyists and offer almost no software except operating systems.

More information about Microage's franchising program is available from Microage's director of franchising at 1425 W. 12 Place, Tempe, Ariz. 85281.

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Independent Sales Outlets Trade Strategies

CW at Comdex '79

By Marcy Rosenberg
CW Staff

LAS VEGAS — For the independent sale organization, adding value often becomes a no-win game of chutes and ladders.

While many of these companies strive to build reputations on the value they add to computer systems, profits may start to slide if the costs in time and labor to develop their own software are not carefully monitored.

Panelists at a recent Comdex '79 session here traded strategies for ensuring that "do-it-yoorself" software development remains a cost-effective part of their businesses.

"It would be utopia to be able to offer software as a standard package, but in our vertical product industry, we will likely face custom system modifications," remarked Thomas K. Moch, president of Integral Business Computing (IBC), which provides turnkey systems for such applications as manufacturing control, accounting, retail travel and distribution.

Noting that "when the value added is software, it's hard to keep under control," Moch outlined the "ground rules" IBC follows to keep software development profitable:

The first rule of thumb is to control the customer. "Get customers to sign off on specifications before programmers lift a pencil to start coding and make it known that there are charges for later program changes."

Second, control the software development project from a management standpoint to guard against what Moch called the programmer phenomenon of "98% complete."

To make sure programmers carry tasks to 100% completion, Moch suggests breaking the software development effort into individual jobs that are easily identified and associated with a number of man-hours. However, while it is often possible to keep track of schedules, costs can get out of control, Moch cautioned.

IBC's tool to monitor both variables, therefore, is a graph on which the firm plots dollars against time for the estimated cost of work scheduled, estimated cost of work performed and actual dollars spent. The cost per job equals the number of hours to complete a task multiplied by the programmer's pay rate.

By plotting the graph over time from when the software development effort begins, IBC is able to track how much jobs cost if running on schedule, whether tasks are running on schedule and the amount of budget variance — which equals the difference between the estimated cost of work performed and the actual dollars speot.

The Expertise Factor

Besides time and labor, other cost factors are the ideas and training given by the independent sales organization to the customer, according to Marj Nickum, vice-president of Total Business Equipment and Systems, a distributor of word processing, data entry, accounting and distributed data processing systems.

"Added value can be the expertise of people and we [the independent sales organizations] give it away every day," Nickum said, citing the hardware and software training and advice given to small business managers to come up with a good system.

"The manager then goes out and markets our ideas, puts them out for bids. I've seen our people spend countless hours for nothing because when it came down to the bidding table, we were a little too high," Nickum lamented.

Her solution? "Charge consultation costs, make sure when qualifying a customer he knows his own business and take control of the bottom line of a sales order."

Management at Nickum's firm must accept each sales order in writing before it goes through. A basic charge for applications training is set for a given number of hours; beyond that time, the cost to the customer is on a time and materials basis.

Also, "we now charge for telephone support calls," Nickum added. While these fess are hard to collect, the customers don't call as often.

Another policy at Total Business Equipment and Systems is to train customers at its site, but using the customer's system. This way, customers can't use their own data and charge the distributor for using their telephone or files, and executives at the user organization won't be present to interrupt employee training.

Turnkey Approach

Because "it's easy to leave customers with the impression that you will do anything to make them happy," Moch said IBC is moving toward more of a turnkey approach in selling its products and services. This means it charges a fixed price that includes training and documentation and it makes crystal clear at the outset what it is selling.

For example, IBC provides two hours of operator training for every $2,000 of the system price. It also requires — within 30 days after a contract is signed — 24 hours of management training split into three eight-hour sessions.

The first of these sessions teaches the parts of the computer and how they work; the second outlines preparations necessary before the computer arrives, such as defining what kind of data is needed up front and learning where to find that data; and the third session delves into the nitty — gritty of the data base function — how to get data out of the system.

Cost of Sales Call

Another cost factor that deserves attention is the number of sales hours devoted to any given customer. At a cost of about $98 a sales call, Pepperell Software — which customizes and installs software packages for Digital Equipment Corp., Qantel and Raytheon & Co. small business systems — could no longer afford to spend "up to 2,000 hours holding customers' hands," commented Aid M. Horton, software design consultant for the firm.

Horton's goals, therefore, are to limit the number of sales hours and qualify a customer as quickly as possible.

Given the many costs associated with adding value, independent sales organizations should consider at what point they would give a sale to the competition.

Moch, for one, bases this kind of decision on the answers to several questions:

- "Does the customer have a budget committed to automating his company?"
- "Am I interested in a business relationship with this customer?"
- "Does my system meet the customer's needs or will I have to make a custom system that I won't be able to resell?"

But he suggested, above all, that the independent seller find out if the customer knows what he wants. If he doesn't, "run."

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Golden Decade Seen Coming

(Continued from Page 57)

tain technology trends will make small business systems more affordable and attractive in the next 10 years.

With semiconductor densities doubling every year and microcomputers taking on more business applications, the cost of acquiring a small business system will continue to plummet at a rapid rate. Calvano sees system costs sliding by about a factor of 3 every five years and memory costs dropping by a factor of 10 over the same time frame.

Disk costs, he said, will fall at about the same rate of other memory, bot in spurts because of jumps in technology changes, such as the recent introduction of 8-in. hard disks costing as little as $40 per 1M byte.

Also, more tightly integrated systems and lower power technologies will surface to cut the costs of power supplies and packaging — costs that have grown to account for up to 30% of current hardware costs, Calvano noted.

The next decade of small business computer technology will also turn reliability and serviceability into less of a hardware and more of a software issue. Calvano envisions a "layered approach" to hardware reliability in which each successive system layer will compensate for occasional failures in the layer below.

For example, at the lowest layer, more reliable electronic components such as solid-state memories will gradually replace rotating mechanical ones. By the mid-1980s, hardware redundancy in the form of error correcting codes will be provided automatically at numerous places within systems.

At that time, remote diagnosis will become more commonplace for all but the smallest systems, where communications costs relative to system costs make it less attractive. Other new forms of service will also surface, such as user-performed repairs and on-line diagnosis and repair by field engineers that will not interfere with ongoing machine operations.

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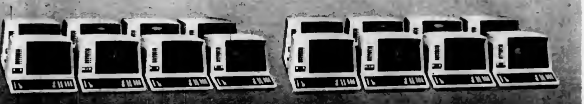

Jilted in New Market, Lear Siegler Retrenches

By Marcy Rosenberg
CW Staff

LAS VEGAS — Still recovering from a brief fling with the fickle small business system market, Lear Siegler, Inc. is now determined to stick by its tried-and-true products — terminals and printers.

"The investment required to enter the small business system market vs. the returns did not justify our staying in small business computers," William A. Terry, president of the firm's Data Products Division explained in an interview here recently. Last July, Lear Siegler withdrew its VDP-1000, a small system based on the Data General Corp. Nova 1200, after barely one year on the market.

Terry estimated the company would have had to spend close to $20 million over the next five years — for setting up separate sales, field service and distributor organizations for the new line — to cull a mere 1% of the small business computer market. "It made no sense, so we dropped the line."

Over a one-year period , Lear Siegler sold 25 VDP-1000s to distributors for $13,000 per unit including CPU, operating system, CRT, printer and multiuser capability for up to 16 terminals, according to Terry. Distributors resold the systems for $21,000 each.

Denying reports that Lear Siegler's failure to provide applications software hurt sales, Terry contended the firm never intended to provide applications software since the VDP 1000 was sold exclusively through distributors and could accommodate an available and abundant supply of Nova 1200-compatible applications software.

Although the VDP-1000 was pulled from the market, several of the machines are used in-house for testing and data processing, such as for mailing lists.

Sticking to Terminals

Even though the small business computer market is growing at a healthy 35% per year, Lear Siegler will not take another crack at this business and has no immediate plans to add intelligent terminals to its dumb and smart terminal lines. Expansion into those lines would require a software development effort, Terry noted, adding that "as hard as it is to find hardware engineers, it is harder to find capable software people."

So, for the time being, the firm will stick to its printer and traditional terminal products. Terry cited a trend toward the "median smart terminal," which he defined as a terminal offering "a couple of pages of memory, some limited editing and formatting capability and user function keys."

He admitted the dumb terminal market has tapered off from 30% annual growth three years ago to 15% per year, a "mediocre growth rate in this business." Lear Siegler has sold more than 85,000 dumb terminals to date, accounting for less than 10% of revenues.

Terry also admitted that IBM's new glass teletypewriter dumb terminal will impact future sales because IBM no longer recommends that users buy the Lear Siegler ADM-3 terminal for use on IBM Series/1 equipment.

"We knew IBM was going to come out with a dumb terminal, but it took two years and none are being delivered yet," he remarked. Lear Siegler was shipping approximately 50 ADM-3s per month to IBM customers.

Terry is banking on the assumption that Lear Siegler's installed base of ADM-3s in Series/1 equipment — totaling "a couple thousand units" — will not switch to the new IBM terminal overnight.

He is also counting on Lear Siegler's price advantage. IBM's terminal, offering "rudimentary editing capabilities," costs between $1,200 and $1,300, compared with the ADM-3, selling for $895. In addition, Lear Siegler's ADM-31, its smart terminal, costs $1,400, only $100 more than the IBM product.

Software a hardship? Let someone else do it.

As applications software packages become increasingly diverse and flexible, user demand for them continues to rise. By 1981, says International Data Corporation, packaged software will account for more than half of software industry revenues.

In our January 28th Special Report, *Applications Packages,* we'll be examining many of the ways users are putting these newer software packages to work for them. Edited by Don Leavitt, *Applications Packages* will take a look at the increasing technological (and financial) feasibility of these new packages, and why they've become so attractive to users. We'll have vendor's stories as well, with articles on:

- *Software evaluation—choosing the right packages for the right system.*
- *Cutting the costs of software maintenance.*
- *Progress conversion—is it worth the effort?*
- *"Firmware emulation" and the technology behind portable packages.*

If you're an MIS Executive, DP Manager, Supervisor or Lead Programmer, you'll want to read our January 28th Special Report. And if you market programming products or services, your ad should be there. Ad closing date is January 11th, and your *Computerworld* representative can give you all the details. Or, to reserve space for your ad, call Frank Collins at (617) 879-0700.

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DG Enters Retail Market

(Continued from Page 57)

tomer base and an awareness of the businesses in its local community. It can offer customers a choice of computer-based solutions to applications needs — a choice which will invariably include other vendors' products.

When a dealer sells a Micronova system, DG will install the hardware and make sure it is up and running, but that is where the vendor's responsibility to the user ends. Dealers will be responsible for getting the software running and will supply on-site training.

Further, DG will expect the retailer to sell two Micronovas a month and expect that the line represent half its volume if the dealer is doing $100,000 monthly, Fallon stated.

Retailers should also provide close to off-the-shelf delivery and keep one Micronova on display and another in the back room at all times, he added.

Retailer training will be provided by DG in conjunction with distributors. Still in the development stage, DG's training progam will most likely extend to the dealers' software personnel and sales staff, teaching how to sell Micronovas "from a feature benefit standpoint" and how to handle the customer on the floor and deal with his predetermined notions of what a computer is.

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John T. Hughes (left) is president of Mainstem Corporation, of Princeton, N.J., subsidiary of PHH Group, Inc. James Schuler is an NCR district manager.

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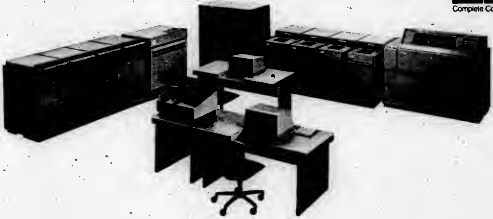

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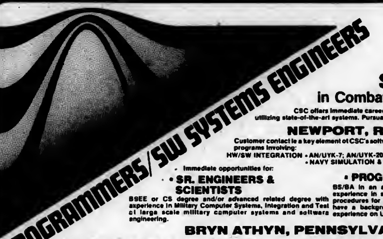

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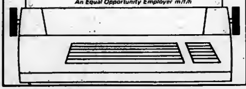

IMS SUPPORT

Corp. Hdqtrs. of multi-million dollar retailer seeks hard-driving, ambitious internal consultant to advise top mgmt. on effective IMS integration. IBM 370/168 OS/VS, COBOL environ. Heavy user interface. Salary $26,000 range. (Fee Paid.) Contact Gerry Battista.

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(617) 423 1200

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Established center for Biological and Environmental Sciences seeks experienced programmer/analyst for 1 year appointment to assist in development of PDP-11 production software. Qualifications include minimum 2-3 years experience with RSTS/E, BASIC +2, RMS 11K and data base management techniques. Exposure to IBM OS JCL helpful. Salary 15-20 K, commensurate with experience. Send resume to

Academy of Natural Sciences of Philadelphia
19th and the Parkway,
Philadelphia, PA 19103
Attn: Charles McElrea

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As the industry leader in the design, manufacture and service of sophisticated video, voice and data communications systems throughout the world, we value the innovative Professional who can keep us at the forefront of the State-of-the-Art! These special opportunities afford you unusual career growth and recognition with a Company which recognizes and rewards individual contributors!

Systems Analysts

Participate in developing our new on-line order-entry system. You should have prior experience in analysis and design of computerized business information systems. Must have COBOL, JCL background, sound knowledge of business functions and strong communication skills. (Job #SL)

Manufacturing Systems Analyst

Become involved as Manufacturing Representative in development of on-line customer order-entry system. Documentation, communication and analytical skills a plus, a strong working knowledge of MRP manufacturing systems required. (Job #JD)

Systems Programmer

You will be using IBM 158 VSI operating system. On-Line Network, ROSCOE Time Sharing System. Requires basic knowledge of assembly language and operating system architecture. BS desirable. (Job #TB)

Data Base Software Analyst

You will be challenged in our Data Base management function! If you know MIS/DB/DC from a technical standpoint and also IMS Data Base design, we have a job for you! Knowledge of IMS application, programming and COBOL desirable. (Job #EC)

These opportunities also exist in our Albuquerque, NM & El Paso, TX Facilities.

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Processor Circuit Design . . . Design, development and evaluation of central control circuitry for high availability general performance processors including initial design, circuit testability evaluation, simulation and analytical studies utilizing state-of-the-art technologies including advanced MOS microcomputers, custom MOS and bipolar VLSI components and gate array technologies. (Naperville)

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Please write stating your area of preferred specialization and geographic location. Include a resume and transcript. Direct it to: Director of Technical Employment, Bell Laboratories, Center 831-83, 600 Mountain Avenue, Murray Hill, N.J. 07974.

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A major national electrical wholesaler located in Southern California is seeking qualified D.P. professionals who enjoy challenge and are career minded. We offer an excellent compensatory package as well as a solid opportunity for growth and career advancement. Our need is immediate, so send your resume and salary history in complete confidence to the address listed below.

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Programmer/Analyst

1-3 years of COBOL with A/R, A/P, and general ledger background. Must be able to develop new programs using basic specifications. DOS JCL knowledge along with on-line program development background a plus.

Mr. R. Erhardt
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Los Angeles, CA 90051

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FLORIDA $40,000

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STARTING SALARY TO 30K

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Excellent fringe benefits including medical, dental, life and accident insurance as well as a company paid pension plan.

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Digital Equipment Corporation is currently in need of a mature hardware professional to establish corporate standards within our development groups. Working in such areas as I/O interfaces, terminal-operating system interfaces, communications interfaces, and instruction sets, you will chair standards review committees, interpret Digital standards and related industry standards, contribute to technical strategies, and review project plans and functional specs.

Seven to ten years of hardware systems design experience, along with some software knowledge, is required. In addition, you must be able to write clearly and concisely. A solid user background, industry standards experience (ANSI, CBEMA, etc.), and project leader or product manager experience, would be an asset.

If you are interested in setting the pace for the world's leading producer of interactive computer systems, please forward your resume, complete with salary history, in confidence, to: Chris Larkin, Digital Equipment Corporation, Dept. B1217 3807, 146 Main Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.

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Strong commitment to on-line systems in a dynamic manufacturing organization. Highly competent, small professional group with excellent opportunity to demonstrate technical capacity. Required:

- **strong COBOL programming skills**
- **some experience with analysis and design**
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Excellent starting salary and benefits with real opportunity for professional growth. Forward resume including salary requirements to:

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Rexham

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The demand still exceeds supply.

- **SYSTEMS ANALYST**
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  To $24,000 2-4 years Life Insurance, IBM OS experience
- **SYSTEMS ANALYST**
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Jerry Anderson or
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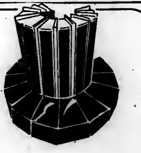

Join us in creating and building the world's largest, fastest, scientific computers.

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International Systems Corporation, the fastest growing supplier of On-Line terminals for Thrift Institutions in the country, has immediate need for top level programmer/analysts with mini/micro programming experience. At ISC we recognize that our software, and the people who create that software, are two of the major reasons for our outstanding success. If you are ambitious, aggressive, a proven performer, ISC has the job for you. Call me collect at (509) 922-3299 to find out why we've been able to build a team, and a track record, that is without compare in our industry, or send your resume today, attention Jim Short. EOE M/F/H

International Systems Corporation
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If you have been considering a move to the beautiful Southwest, we may have an opportunity of interest to you.

We are a Phoenix, Arizona based savings and loan with assets of over $1.2 billion and the state's leading residential real estate lender. We are not utilizing an IBM 370-148 in an OS/VS environment supporting a state-wide terminal network.

We presently have a position open for a PROGRAMMER/ANALYST who will be responsible for the programming, implementation and maintenance of large and complex on-line application systems operative under CICS. Applicant should have 3 to 5 years COBOL experience in an OS environment. Financial institution experience preferred.

If this describes your background and interests and you are seeking to relocate in the Phoenix area, please direct your resume including salary history and requirements immediately to 3003 North Central Avenue, Suite 402, Phoenix, Arizona 85012. In addition to a comprehensive compensation package we offer an excellent opportunity for professional growth.

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Computer Sciences Corporation, the world's leading independent company in the information Sciences, has been, consistently, in the forefront for the development of high-performance computer software systems. The System Sciences Division of CSC is involved in some of the most exciting and enviable Space Science programs in the area of state-of-the-art Information Systems. We offer OPEN OPPORTUNITY for career advancement. Working in an atmosphere of a broad range of technical programs, your skills will continually increase and develop as you work with multidisciplinary teams of software specialists.

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EDP

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MANAGERS

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MONY has an exciting and dynamic state-of-the-art environment including an 8 meg 3033 and a 370-158 using OS/VS, MVS, RJE, 27 TSO terminals for on-line program development, IMS Data Base/Data Communications, Computer Output to Microfiche, ADF, Panvalet, and UCC TEN Data Dictionary.

MONY offers a strong professional education program with in-house classes supplemented by vendor courses. A comprehensive Career Development program describes your career path alternatives. MONY provides liberal benefits including 3 weeks vacation and variable working hours.

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MONEY will pay agency fees, or you may send your resume, including salary requirements, directly to.

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Syracuse, New York 13221

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MONY
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CHIEF ENGINEER

The position of Chief Engineer requires an individual with knowledge of digital computers (particularly minicomputers), interfacing of minicomputers with disks, tapes, cards and printers, and logic design, as well as familiarity with practical electronics, who will be responsible for the management of the Engineering and Drafting Department which will include active participation in the design of CPU computers and computer systems, maintenance of an automatic test equipment system, and preparation of, as well as making improvements in accordance with, engineering change notices. Work will be performed in a clean, well lit, well ventilated research and development environment. The successful candidate will possess 5 years experience as a chief engineer or in engineering management. Salary $32,500 per year.

If interested, please send resumes to our Personnel Director

gri

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Grow with us in South Florida

Racal-Milgo, headquartered in Miami, Florida, is a world leader in the data communications field. In order to keep pace with our record sales and continued growth, we have opened career opportunities for the following positions:

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Maintain and administer a total Univac Data Communications Network, including updates and changes to software. Knowledge of Univac 1100, communications management systems and two years programming in 1100 assembly. TIP and network hardware preferred

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Individuals should have 1-3 years programming experience with business applications utilizing COBOL. Manufacturing environment, order entry/billing experience preferred.

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Positions require implementing and maintaining DMS 1100 data bases, documenting, designing and implementing load/reload programs, training users, etc. A minimum of 2-4 years experience in COBOL and usage of DMS 1100 preferred.

We also have openings for Technical Writers, Technical Specialists, Field Engineers and Technicians.

We offer competitive salaries and excellent company benefits including liberal relocation allowance. For immediate consideration, call Bruce Czarniak collect at (305) 591-5212 Monday through Friday, or send your resume to:

Racal-Milgo

Racal-Milgo, Inc.
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RACAL

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Datapoint Corporation has grown into a 232 million dollar, Fortune 1000 company in just eleven years. This is due to the right products and the right people. Our ongoing growth has created opportunities for Electronics Engineers and Instructors in our Customer Service Division in San Antonio, Texas.

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You will be responsible for product development, maintenance strategy and product support on a wide range of innovative and diversifed systems. These positions require a BSEE and 5 to 7 years of hardware and/or software systems experience in sustaining engineering. This experience should be on CPUs, disks, tapes and printers.

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You should have 2 to 4 years experience as instructor or course developer. Applicable experience must include processors and disk based systems training.

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These positions are at our headquarters in San Antonio, Texas, a city which offers year 'round recreation in the heart of the Texas Hill Country. You will find attractive, affordable housing, a low cost of living and a broad spectrum of educational and cultural activities.

Datapoint offers competitive incomes, generous benefit programs and a work environment that provides both personal and professional growth.

Qualified applicants should send resumes, including salary history to: M.H. Palacios, Datapoint Corporation, 9725 Datapoint Drive, MS S-63, San Antonio, Texas 78284.

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DATAPOINT CORPORATION

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RCA CORPORATION has immediate requirements for computer professionals with the following specialties at its highly sophisticated, expanding Corporate Computer Center located in Cherry Hill, New Jersey, fifteen minutes from center city Philadelphia.

- **MVS/JES2 SYSTEMS PROGRAMMING**
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The Center utilizes two 370/168's and a 3032 operating under MVS/JES2-NJE and VM/370; two UNIVAC 90/80's operating under VS/9; and six COMTEN Communication Processors to service a worldwide Corporate interactive and remote batch user community.

The Systems Programming positions require a proficiency in the use of Assembler and the development, modification, maintenance and use of the respective, or closely related, operating systems and support software.

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Clients will pay all cost. Mail confidential resume to: Rex Bailey, CDP

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Academic year is from September 1 — April 30 with limited spring or summer teaching. Deadline for resume and any supporting materials March 15, 1980. **Send resume to Dr. H. D. Callihan, Search Coordinator, Department of Mathematical and Computing Sciences, University of Pittsburgh at Johnstown, Johnstown, PA 15904.**

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The candidate we seek will provide technical leadership and innovation in advanced operating system concept and algorithm development. Qualified individuals will possess strong analytical capabilities and will participate in research, development and evaluation of advanced and future large scale, high speed computer systems from conceptual design to hardware implementation.

Candidates should have a related-degree or equivalent and 5 years experience or advanced related degree and 3 years experience.

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CRAY

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Digital's Software Architecture Management team is responsible for the evolution and management of software architecture throughout Digital's Central Engineering organization. As a member of this team, you'll have the opportunity to make a corporate impact on one of the most successful computer companies in the industry.

Interacting with software implementors throughout the corporation to ensure the consistent and compatible evolution of architectures, you will provide leadership, review and support as required. Maintaining a broad overview, you will be an internal consultant on architectural issues, often orchestrating interaction between various development activities.

Strong communications and interpersonal skills are a prerequisite. Additionally, you should have a solid technical background, with experience in operating systems, communications software and/or information management systems desirable. An advanced degree or equivalent is an asset and a knowledge of Digital products helpful.

If you are interested in this challenging and highly-visible opportunity, please forward your resume, including salary history, to Chris Larkin, Digital Equipment Corporation, Dept. B807 1217, 146 Main Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.

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Help define our next-generation mid-range computer systems.

If you'd rather be shaping far-reaching strategies in computers, terminals and communication systems than working on a nailed-down program, talk to NCR-Millsboro.

We're looking for far-sighted Systems Engineers who can interface with divisional and corporate management, participate in high level decision making, and either define architectures, communication links and network protocols, or provide key liaison functions.

Here, in short, are three positions that offer uncommon responsibilities and growth opportunity:

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Primary focus will be on systems architecture. Calls for strong experience utilizing bit-oriented communications protocols and disciplines. Background should also include analysis of network node concentration and distribution techniques . . . switching theory and network control . . . communication drivers . . . cluster (ECR) control . . . packet routing . . . and inter-network interface conversions (SNA,X25).

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Primary assignment will be computer performance analysis. Requires experience in microprocessor hardware interaction simulation . . . communications concentration and network traffic pattern/overhead analysis . . . processor benchmark analysis . . . language level/performance expectation analysis . . . computer system modelling . . . and knowledge of GPSS.

Project Planning Coordinator

Primary assignment will be to monitor projects, with heavy involvement at all stages . . . assisting project managers in planning . . . scheduling of engineering specifications and documentation . . . chairing R&D schedule reviews . . . correlating budgets . . . and interfacing with corporate product management. Requires broad systems engineering background.

Millsboro, Delaware

. . . is located on the beautiful, unspoiled, stress-free and still affordable Delmarva Peninsula. We're minutes away from marinas, wildlife preserves, and some of the nation's finest beaches . . . yet within reach of Philadelphia, Atlantic City, Baltimore and Washington.

Learn more about these key opportunities with a fast-growing unit of the world's second largest computer company. Call (302) 934-8111 collect. Or send confidential resume and salary history to: Mr. Ron Tull, Dept. A50 , NCR Corporation, Engineering & Manufacturing, Mitchell Road, Millsboro, Delaware 19966.

NCR
Complete Computer Systems

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DTSS

SYSTEMS SOFTWARE PROFESSIONALS . . .

DTSS Incorporated has a continuing need for truly excellent programmer/analysts and project leaders in our systems software group.

DTSS Incorporated participated in the joint development of the Dartmouth Time Sharing System with Dartmouth College. The company is now a subsidiary of Metropolitan Life Insurance Company, licensing software and providing services to industrial organizations, government agencies, academic institutions, and computer service companies worldwide.

Current projects being advanced by our technical staff include a relational data base manager, a high speed communications processor, extensions to programming languages, and operating system development.

DTSS Incorporated
10 Allen Street
Hanover, NH 03755
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ADIRONDACK FOOTHILLS

We are a dynamic growth company, broadly based in computer-related sciences, performing a variety of services to both government agencies and small/medium sized businesses. We are currently working in the areas of remote sensor data exploitation, data base performance, computer graphics applications, office automation, and advanced computer technology for military processing systems. We are seeking experienced individuals with computer science and/or Electrical Engineering backgrounds. Areas of particular interest are computer graphics, computer system performance analysis, modeling, and data base management. We will also give consideration to persons at entry levels whose credentials are strong.

We offer an excellent opportunity for career advancement in a stimulating work environment, competitive salaries, and an attractive fringe benefit package including continuing education. Rome, located at the foothills of the Adirondack mountains, offers excellent year round outdoor sports, recreation, hunting and fishing.

Call, visit us, or send your resume. All inquiries handled with the strictest of confidentiality.

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1721 Black River Blvd.
Rome, NY 13440
(315) 337-1000

Analyst Programmer

Seattle

Rated the most livable city in the country, Seattle is a recreational paradise. It is also the Northwest's busiest seaport. As a result, the employees at the Port of Seattle can expect a diverse array of assignments as well as the comfort of long term job security at our interesting Seattle waterfront location.

Currently, we are looking for a top-notch analyst programmer for our systems and data processing department. Your experience must include two years' solid programming and analysis, COBOL and disc file organization experience. You must have a degree in Business or Math.

You will receive an excellent fringe benefits package, a competitive salary and complete relocation reimbursement.

For immediate consideration, contact **Ms. Charlotte Zackery at (206) 587-5324** or write to her at **P.O. Box 1209, Seattle, WA 98111.** An equal opportunity employer.

Port of Seattle

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16) Programmer/Analysts
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Minimum of 4 years experience. Will study, analyze and evaluate existing systems relative to their technical and operational problems with respect to existing facilities, available equipment, and capability to meet established requirements. Experience with electrical mechanical devices. BS/BA or equiv

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21) Senior Software Engineers
Will define requirements, monitor development, direct and assist in data collection, c/o perform acceptance of software for an EMCS site. BS Engr or CS

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3 to 5 years experience in programming. HP experience desired. Will assist in design and implementation of system software for energy management systems. BS in Eng or CS

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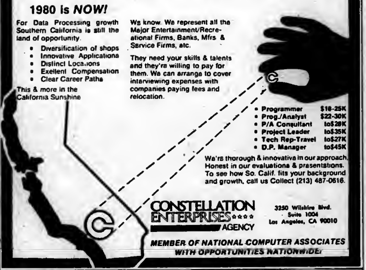

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System Programmer 4331 DOS/VSE 3033 OS/MVT Several in California	To30K
Financial Analyst PL/1 BA Salt Lake City	To 28K
Programmer/Analyst OS COBOL Memphis	To 23K
Programmer/Analyst Location of your choice 2 year Min COBOL	To 23K

SOUTH WEST

Programmers COBOL Entry Level	To 16K
Sr. System Specialist 370 SVS or MVS	To 34K
System Analyst Life Insurance	To 25K
Software Engineers BSEE Pipeline Process Control	To 35K
EDP Manager Houston OS/VS1 8 years	To 40K
Programmer/Analyst Phoenix COBOL	To 24K
System Programmer OS/MVS	To 28K
CICS Programmers Many locations	To 25K

NORTH EAST

Programmers DOS/VS & OS/VS1 North to South	To 21K
System Programmer DOS/VS CICS DL/1	To 30K
Software Specialist New York	To 28K
Programmer/Analyst OS VS1 New Jersey Bank	To 25K
Programmer Pennsylvania-Insurance	To 20K
Sr. System Software Connecticut VM/370	To 32K
Project Lead South Carolina Manufacturing	To 28K
Sr. Programmer Analyst Georgia 4 yr Banking Exp	To 27K

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Seattle, WA 98101
206-622-4878

John Griffith
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Houston, TX 77042
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For application forms and procedures contact **Dr. Bruce Flint, State Agent (Personnel and Programs), Cooperative Extension Service, Room 183, Knapp Hall, University Station, Baton Rouge, LA 70803. Telephone No. (504) 388-6083.** Deadline for applying is January 5, 1980.

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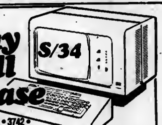

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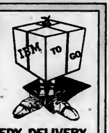

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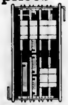

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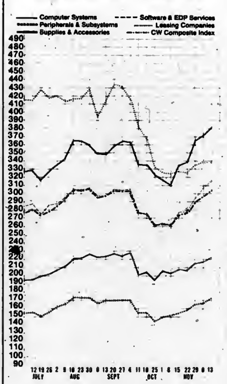

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 12, 1979

All statistics compiled, computed and formatted by
TRADE QUOTES, INC
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 60	25 7/8	+2 3/8	+10.1
N	BURROUGHS CORP	59- 87	70 5/8	-1 1/8	-1.3
O	COMPUTER AUTOMATION	9- 44	11 1/2	- 1/4	-2.1
N	CONTROL DATA CORP	23- 87	55	- 1/8	-0.2
O	CRAY RESEARCH INC	8- 51	50 1/2	+5 1/4	+11.6
N	DATA GENERAL CORP	42- 74	54 3/8	-2 7/8	-5.0
N	DATAPOINT CORP	34-105	104 3/4	+ 3/4	+0.7
N	DIGITAL EQUIPMENT	39- 69	67 1/2	+ 1/8	+0.1
N	ELECTRONIC ASSOC.	2- 13	7	0	0.0
A	ELECTRONIC ENGINEER.	9- 15	15 7/8	+ 5/8	+4.0
N	FOUR-PHASE SYSTEMS	19- 46	45	-1 3/8	-2.9
N	FOXBORO	28- 46	38 3/4	- 1/4	-0.6
O	GENERAL AUTOMATION	7- 26	16 3/8	+4	+32.3
O	GRI COMPUTER CORP	1- 3	1/2	0	0.0
N	HEWLETT-PACKARD CO	26- 83	58	+ 3/4	+1.3
N	HONEYWELL INC	43- 83	81	+ 1/2	+0.6
N	IBM	62-321	65 1/4	- 1/2	-0.7
O	MANAGEMENT ASSIST	9- 29	20 1/2	+2 5/8	+14.6
O	MANUFACTURING DATA S	9- 35	33 1/2	-1	-2.9
O	MINI-COMPUTER SYST	2- 8	2 7/8	- 1/8	-4.1
O	MODULAR COMPUTER SYS	7- 18	12 1/8	+1 1/4	+11.4
N	NCR	37- 81	67 3/4	+2	+3.0
N	PRIME COMPUTER INC	9- 23	23	- 1/8	-0.5
N	PERKIN-ELMER	17- 47	39	- 3/8	-0.9
N	SPERRY RAND	33- 52	50	+ 7/8	+1.7
A	SYSTEMS ENG. LABS	11- 24	18 1/4	+ 1/8	+0.6
O	TANDEM COMPUTERS INC	13- 41	41	+1 1/2	+3.7
A	WANG LABS.	6- 32	30 5/8	-1 3/8	-4.2

LEASING COMPANIES

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	10- 21	17 1/4	+ 1/4	+3.4
O	COMDISCO INC	3- 21	11	- 1/2	-4.3
A	COMMERCE GROUP CORP	1- 1	1/4	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	2 1/8	0	0.0
O	CONTINENTAL INFO SYS	3- 15	2 7/8	0	0.0
N	DATRONIC RENTAL	1- 4	2 5/8	+ 1/8	+5.0
A	DCL INC	3- 6	5 1/4	+ 1/8	+2.4
N	DPF INC	8- 14	8	- 5/8	-7.2
N	ITEL	4- 36	5	- 1/8	-2.4
N	LEASCO CORP	24- 59	58 1/2	+4 1/2	+8.3
O	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEX CORP	2- 7	2 3/4	0	0.0
N	U.S. LEASING	12- 20	14 1/2	- 5/8	-4.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED CORP TECH	1- 2	3/4	0	0.0
O	ANACOMP INC	8- 24	17	- 1/2	-2.8
O	ANALYSTS INTL CORP	3- 5	4 1/8	+ 1/8	+3.1
A	APPLIED DATA RES.	8- 17	10 1/4	+ 5/8	+6.4
N	AUTOMATIC DATA PROC	26- 40	38 5/8	+ 3/8	+1.0
O	COMPU-SERV NETWORK	5- 18	17 1/2	+ 1/4	+1.4
O	COMPUTER HORIZONS	1- 8	4 3/4	- 1/2	-9.5
O	COMPUTER NETWORK	5- 10	6 3/4	+ 7/8	+14.9
N	COMPUTER SCIENCES	8- 19	19 3/8	+1	+5.4
O	COMPUTER TASK GROUP	1- 7	6 3/4	0	0.0
O	COMPUTER USAGE	2- 4	1 7/8	- 1/8	-6.2
O	COMPUT AUTO REP SVC	4- 10	4 3/8	- 3/8	-7.8
O	COMSHARE	6- 26	18 3/4	+1 1/4	+7.1
O	CULLINANE CORP	14- 33	28 3/4	-1 1/2	-4.7
O	DATA DIMENSIONS INC	1- 9	2 1/8	+ 3/8	+21.4
O	DATATAB	1- 4	1	- 1/4	-20.0
O	DSI CORP	4- 8	4 1/2	+ 1/4	+5.8
N	ELECTRONIC DATA SYS.	15- 28	28	0	0.0
O	INSYTE CORP	1- 3	1 1/2	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 8	6	+ 3/4	+14.2
O	KEYDATA CORP	1- 4	4 1/8	+ 5/8	+17.8
A	LOGICON	10- 19	17 3/8	+1 1/8	+6.9
O	NATIONAL DATA CORP	7- 17	16 1/2	+ 3/4	+4.7
O	PLANNING RESEARCH	4- 10	8 1/8	+ 1/8	+2.0
O	PROGRAMMED TAX SYSTS	3- 5	4 3/8	+ 1/4	+6.0
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	3- 7	4 1/2	+ 1/8	+2.8
O	REYNOLDS & REYNOLD	18- 36	25	0	0.0
O	SCIENTIFIC COMPUTERS	3- 10	9 1/2	+ 1/2	+5.5
N	TYMSHARE INC	18- 50	49 3/4	- 3/8	-0.7
A	URS SYSTEMS	5- 8	8	+ 1/8	+1.5
N	WYLY CORP	1- 7	6	+ 1/2	+9.0

PERIPHERALS & SUBSYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	10- 32	15 1/4	+1 3/8	+10.0
N	AMPEX CORP	10- 20	19 5/8	+ 1/8	+0.6
O	ANDERSON JACOBSON	5- 14	13 7/8	+1 7/8	+15.6
N	APPLIED DIG DATA SYS	6- 22	8 3/8	- 5/8	-6.9
O	AUTO-TROL TECHNOLOGY	14- 35	32 1/4	+ 3/4	+2.3
O	BEEHIVE INT'L	3- 7	5	+ 1/8	+2.5
A	BOLT,BERANEK & NEW	6- 18	17 3/8	+ 3/8	+2.2
N	BUNKER-RAMO	18- 28	26 1/8	- 1/2	-1.8
O	CAMBRIDGE MEMORIES	1- 9	1 5/8	+ 1/4	+18.1
O	COMPUTER DEVICES INC	5- 8	8 1/8	+1 5/8	+25.0
O	CENTRONICS DATA CORP	10- 54	47 1/2	-3 1/2	-6.8
O	COGNITRONICS	1- 4	2 1/8	0	0.0
O	COMPUTER COMMUN.	6- 10	6	- 1/4	-4.0
O	COMPUTER CONSOLES	4- 18	17 1/2	- 1/2	-2.8
A	COMPUTER EQUIPMENT	3- 6	4 7/8	+ 3/8	+8.3
O	COMPUTER TRANSCEIVER	1- 8	3 5/8	- 1/8	-3.3
O	COMPUTERVISION CORP	5- 50	49 5/8	+3 1/4	+7.0
O	COMRAC CORP	13- 26	16	- 1/8	-0.8
A	DATA ACCESS SYSTEMS	6- 10	8	+ 1/4	+2.0
A	DATA PRODUCTS CORP	13- 25	18 1/4	+2	+17.5
O	DATUM INC	2- 8	2 3/8	0	0.0
O	DECISION DATA COMPUT	2- 8	2 5/8	- 1/8	-4.6
O	DELTA DATA SYSTEMS	1- 1	1/2	0	0.0
N	DOCUMATION INC	6- 36	21 1/8	- 5/8	-2.8
O	DATARAM CORP	6- 32	32	+4 3/4	+17.4
N	ELECTRONIC M & M	3- 5	3 1/2	0	0.0
O	EVANS & SUTHERLAND	20- 42	37 1/2	-2 1/2	-6.2
O	FABRI-TEK	1- 2	3/4	0	0.0
O	GENERAL COMPUTER SYS	1- 3	1 1/8	0	0.0
O	GENERAL DATACOMM IND	9- 21	21 1/4	+3 1/4	+18.0
O	HAZELTINE CORP	10- 21	19 7/8	-1	-4.7
O	HARRIS CORP	17- 36	33 1/4	+1 3/4	+5.6
O	INFOREX INC	1- 11	1 1/4	- 1/4	-16.6
O	INFORMATION INTL INC	7- 12	8 1/4	- 1/4	-2.9
O	INFOTON	1- 3	2 1/2	+ 1/8	+5.2
O	INTEL CORP	26- 72	68	+2 1/2	+3.4
O	INTERSIL	7- 32	28 1/4	+ 1/4	+0.8
A	LUNDY ELECTRONICS	4- 8	6 5/8	- 3/8	-5.3
O	MSI DATA CORP	6- 19	9 1/4	+1 5/8	+21.3
N	MEMOREX	10- 50	21 1/8	+1 1/2	+7.6
N	MOHAWK DATA SCI	6- 16	15 3/4	+ 1/8	+0.7
O	ONEX	2- 8	4 1/2	0	0.0
O	PANADYNE CORP	9- 24	24 3/8	+1 3/8	+5.9
A	PENRIL CORP	5- 14	14	+ 3/4	+5.6
O	PERTEC CORP	8- 17	10 3/8	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RAMTEK CORP	7- 14	13	- 3/8	-2.8
O	RECOGNITION EQUIP	5- 13	6 7/8	+ 1/4	+3.7
O	SCAN DATA	1- 5	1 5/8	+	+3.0
N	STORAGE TECHNOLOGY	14- 46	17 5/8	+ 3/4	+4.4
O	SYKES DATATRONICS	6- 20	19 1/4	+ 3/4	+4.0
O	T BAR INC	11- 26	25 1/2	+1 1/2	+6.2
A	TEC INC	6- 13	6 3/8	+ 5/8	+10.8
N	TEKTRONIX INC	33- 63	59 7/8	+ 7/8	+1.4
N	TELEX	3- 6	4 1/8	+ 1/2	+13.7
O	TESDATA SYSTEMS CP	8- 26	10 3/4	+ 1/2	+4.8
O	TIMEPLEX INC	4- 11	10 3/4	- 1/4	-2.2
O	WILTEK INC	1- 2	1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 12	11 1/4	+ 1/2	+4.0
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	21 3/4	+ 3/8	+1.7
O	CYBERMATICS INC	1- 1	3/4	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	26 3/8	+ 1/8	+0.4
N	ENNIS BUS. FORMS	5- 21	16 3/8	+ 1/2	+3.1
N	3M COMPANY	43- 66	50 3/8	+ 1/8	+0.2
O	MOORE CORP LTD	26- 34	30 5/8	+ 5/8	+2.0
N	NASHUA CORP	18- 37	30 1/2	- 1/2	-1.6
O	STANDARD REGISTER	20- 29	26 1/2	+1 1/2	+6.0
A	TAB PRODUCTS CO	8- 19	16 1/2	+1 5/8	+10.9
A	WABASH MAGNETICS	10- 22	14 3/4	+ 1/2	+3.5
N	WALLACE BUS FORMS	18- 33	20 1/8	+ 1/2	+1.0

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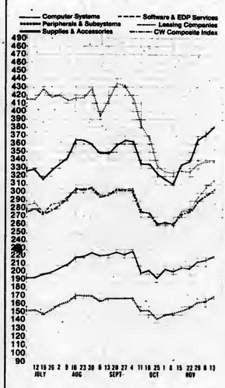

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 12, 1979

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 60	25 7/8	+2 3/8	+10.1
N	BURROUGHS CORP	59- 87	78 5/8	-1 1/8	-1.3
O	COMPUTER AUTOMATION	9- 44	11 1/2	- 1/4	-2.1
N	CONTROL DATA CORP	23- 37	55	- 1/8	-0.2
O	CRAY RESEARCH INC	8- 31	30 1/2	+3 1/4	+11.6
N	DATA GENERAL CORP	42- 76	54 3/8	-2 7/8	-5.0
N	DATAPOINT CORP	34-105	104 3/4	+ 3/4	+0.7
N	DIGITAL EQUIPMENT	39- 69	67 1/2	+ 1/8	+0.1
N	ELECTRONIC ASSOC.	2- 13	7	0	0.0
A	ELECTRONIC ENGINEER.	9- 18	15 7/8	+ 3/8	+2.4
N	FOUR-PHASE SYSTEMS	19- 46	43	-1 3/8	-2.8
N	FOXBORO	28- 44	38 3/4	- 1/4	-0.6
O	GENERAL AUTOMATION	7- 24	16 3/8	+4	+32.3
O	GRI COMPUTER CORP	1- 3	1/2	0	0.0
N	HEWLETT-PACKARD CO	24- 63	58	+ 3/4	+1.3
N	HONEYWELL INC	43- 83	81	+ 1/2	+0.6
N	IBM	62-321	63 1/4	- 1/2	-0.7
O	MANAGEMENT ASSIST	9- 29	20 1/2	+2 5/8	+14.6
O	MANUFACTURING DATA S	9- 35	33 1/2	-1	-2.8
O	MINI-COMPUTER SYST	2- 8	2 7/8	- 1/8	-4.1
O	MODULAR COMPUTER SYS	7- 18	12 1/8	+1 1/4	+11.4
N	NCR	37- 81	67 3/4	+2	+3.0
N	PRIME COMPUTER INC	9- 23	23	- 1/8	-0.3
N	PERKIN-ELMER	17- 41	38	- 3/8	-0.8
N	SPERRY RAND	33- 52	50	+ 7/8	+1.7
A	SYSTEMS ENG. LABS	11- 24	18 1/4	+ 1/8	+0.6
O	TANDEM COMPUTERS INC	13- 41	41	+1 1/2	+3.7
A	WANG LABS.	8- 32	30 3/8	-1 3/8	-4.2

LEASING COMPANIES

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	13- 21	17 1/4	+ 1/4	+1.4
O	COMDISCO INC	3- 21	11	- 1/2	-4.3
A	COMMERCE GROUP CORP	1- 1	1/4	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	2 1/8	0	0.0
O	CONTINENTAL INFO SYS	3- 13	2 7/8	0	0.0
N	DATRONIC RENTAL	1- 6	2 3/8	+ 1/8	+3.0
A	DCL INC	3- 6	5 1/4	+ 1/8	+2.4
N	DPF INC	8- 14	8	- 3/8	-7.2
N	ITEL	4- 36	5	- 1/8	-2.4
N	LEASCO CORP	24- 59	58 1/2	+4 1/2	+8.3
O	LEASPAC CORP	1- 4	1/4	0	0.0
A	PIONEER TEX CORP	2- 7	2 3/4	0	0.0
N	U.S. LEASING	12- 26	14 1/2	- 5/8	-4.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	3/4	0	0.0
O	ANACOMP INC	8- 24	17	- 1/2	-2.8
O	ANALYSTS INTL CORP	3- 5	4 1/8	+ 1/8	+3.1
A	APPLIED DATA RES.	8- 17	16 1/4	+ 5/8	+4.0
N	AUTOMATIC DATA PROC	24- 40	34 3/8	+ 3/8	+1.0
O	COMPU-SERV NETWORK	5- 18	17 1/2	+ 1/4	+1.4
O	COMPUTER HORIZONS	1- 9	4 3/4	- 1/2	-9.5
O	COMPUTER NETWORK	5- 16	8 3/4	+ 7/8	+11.1
N	COMPUTER SCIENCES	8- 18	18 3/8	+1	+5.4
O	COMPUTER TASK GROUP	1- 7	6 3/4	0	0.0
O	COMPUTER USAGE	2- 6	1 7/8	- 1/8	-6.2
O	COMPUT AUTO REP SVC	4- 10	4 3/8	- 3/8	-7.8
O	COMSHARE	6- 26	18 3/4	+1 1/4	+7.1
O	CULLINANE CORP	14- 33	29 3/4	-1 1/2	-4.7
O	DATA DIMENSIONS INC	1- 8	2 1/8	+ 3/8	+21.4
O	DATATAB	1- 4	1	- 1/4	-20.0
O	DSI CORP	4- 8	6 1/2	+ 1/8	+2.0
N	ELECTRONIC DATA SYS.	13- 28	20	0	0.0
O	INSTTE CORP	1- 3	1 1/2	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 6	6	+ 3/4	+14.2
O	KEYDATA CORP	1- 4	4 1/8	+ 5/8	+17.8
A	LOGICON	10- 19	17 3/8	+1 1/8	+6.8
O	NATIONAL DATA CORP	7- 17	16 1/2	+ 3/4	+4.7
N	PLANNING RESEARCH	4- 10	6 1/8	+ 1/8	+2.0
O	PROGRAMMED TAX SYSTS.	3- 5	4 3/4	+ 1/4	+6.0
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	3- 7	4 1/2	+ 1/8	+2.8
O	REYNOLDS & REYNOLDS	18- 36	29	0	0.0
O	SCIENTIFIC COMPUTERS	3- 10	9 1/2	+ 1/2	+5.5
N	TYMSHARE INC	18- 50	49 3/4	- 3/8	-0.7
A	URS SYSTEMS	5- 8	8	+ 1/8	+1.3
N	WYLY CORP	1- 7	6	+ 1/2	+9.0

PERIPHERALS & SUBSYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	13- 32	15 1/8	+1 3/8	+10.0
N	AMPEX CORP	10- 20	18 5/8	+ 1/8	+0.6
O	ANDERSON JACOBSON	5- 14	13 7/8	+1 7/8	+15.6
N	APPLIED DIG DATA SYS	8- 22	8 3/4	- 5/8	-6.6
O	AUTO-TROL TECHNOLOGY	14- 35	32 1/4	+ 3/4	+2.3
O	BEEHIVE INT'L	3- 7	3	+ 1/8	+4.3
A	BOLT,BERANEK & NEW	8- 18	17 3/8	+ 3/8	+2.2
N	BUNKER-RAMO	18- 29	26 1/8	- 1/2	-1.8
O	CAMBRIDGE MEMORIES	1- 4	1 3/8	+ 1/8	+10.0
O	COMPUTER DEVICES INC	5- 8	8 1/8	+1 5/8	+25.0
N	CENTRONICS DATA COMP	16- 54	47 1/2	-3 1/2	-6.8
O	COGNITRONICS	1- 4	2 1/8	0	0.0
O	COMPUTER COMMUN.	6- 10	6	- 1/4	-4.0
O	COMPUTER CONSOLES	4- 18	17 1/2	- 1/2	-2.7
A	COMPUTER EQUIPMENT	3- 6	4 7/8	+ 3/8	+8.3
O	COMPUTER TRANSCEIVER	1- 3	2 5/8	- 1/8	-3.3
O	COMPUTERVISION CORP	5- 50	44 5/8	+3 1/4	+7.8
N	CONRAC CORP	14- 26	16	- 1/8	-0.7
A	DATA ACCESS SYSTEMS	8- 18	8	+ 1/4	+2.0
N	DATA PRODUCTS CORP	13- 25	19 1/8	+2	+11.3
O	DATUM INC	2- 8	2 3/8	0	0.0
O	DECISION DATA COMPUT	2- 6	2 5/8	- 1/4	-8.6
O	DELTA DATA SYSTEMS	1- 1	1/2	0	0.0
N	DOCUMATION INC	6- 34	21 1/8	- 3/8	-2.0
O	DATARAM CORP	8- 32	32	+4 3/4	+17.4
N	ELECTRONIC M & M	3- 8	3 1/2	0	0.0
O	EVANS & SUTHERLAND	20- 42	37 1/2	-2 1/2	-6.2
O	FABRI-TEK	1- 2	3/4	0	0.0
O	GENERAL COMPUTER SYS	1- 3	1 7/8	0	0.0
O	GENERAL DATACOMM IND	9- 21	21 1/4	+3 1/4	+18.0
N	HAZELTINE CORP	10- 21	18 7/8	-1	-4.7
N	HARRIS CORP	17- 36	33 1/4	+1 3/4	+5.3
O	INFOREX INC	1- 11	1 1/4	- 1/4	-16.4
O	INFORMATION INTL INC	7- 12	8 1/4	- 1/4	-2.9
O	INFOTON	1- 3	2 1/2	+ 1/8	+5.2
O	INTEL CORP	26- 72	69	-2 1/2	-3.4
O	INTERSIL	3- 32	28 1/4	+ 1/4	+0.9
A	LUNDY ELECTRONICS	4- 8	6 3/8	- 3/8	-5.3
O	MSI DATA CORP	6- 10	9 1/4	+1 5/8	+21.3
N	MEMOREX	18- 59	21 1/8	+1 1/2	+7.6
N	MOHAWK DATA SCI	8- 14	15 3/4	+ 1/8	+0.7
O	ONEX	2- 8	6 1/2	0	0.0
O	PARADYNE CORP	8- 24	24 3/8	+1 3/8	+5.9
A	PENRIL CORP	5- 14	14	+ 3/4	+5.6
N	PERTEC CORP	8- 17	14 3/8	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RAMTEK CORP	3- 14	13	- 3/8	-2.8
O	RECOGNITION EQUIP	5- 13	8 7/8	+ 1/4	+2.9
O	SCAN DATA	1- 5	1 5/8	+	+8.3
N	STORAGE TECHNOLOGY	14- 46	17 5/8	+ 3/4	+4.6
O	SYKES DATATRONICS	4- 26	18 1/4	+ 3/4	+4.3
O	T BAR INC	11- 26	25 1/2	+1 1/2	+6.2
A	TEC INC	8- 13	6 3/8	+ 5/8	+10.9
N	TEKTRONIX INC	33- 63	59 7/8	+ 7/8	+1.4
N	TELEX	3- 9	4 1/4	+ 1/2	+13.7
O	TESDATA SYSTEMS CP	8- 20	18 3/4	+ 1/2	+2.8
O	TIMEPLEX INC	4- 11	10 3/4	- 1/4	-2.2
O	WILTEK INC	1- 2	1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1978-79 RANGE (1)	CLOSE DEC 12 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	4- 12	11 1/4	+ 1/2	+4.6
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	21 3/4	+ 3/8	+1.7
O	CYBERMATICS INC	1- 1	3/4	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	26 3/8	+ 1/8	+0.4
N	ENNIS BUS. FORMS	5- 21	18 3/8	+ 1/2	+3.1
N	3M COMPANY	43- 66	58 3/8	+ 1/8	+0.2
O	MOORE CORP LTD	26- 34	30 5/8	+ 3/8	+2.0
N	NASHUA CORP	18- 37	30 1/2	- 1/2	-1.6
O	STANDARD REGISTER	20- 29	26 1/2	+1 1/2	+6.0
O	SAB PRODUCTS CO	8- 19	18 1/2	+1 5/8	+10.9
A	WABASH MAGNETICS	10- 22	14 3/4	+ 1/2	+3.5
N	WALLACE BUS FORMS	18- 33	24 1/8	+ 1/2	+2.1

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